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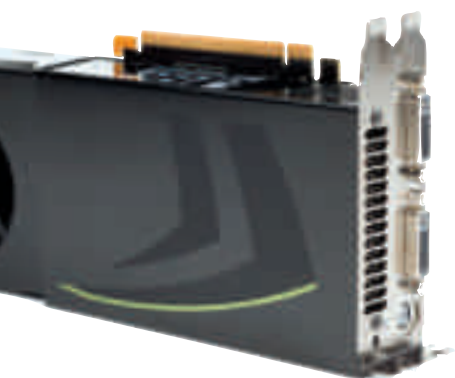
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AUGUST

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SUBSCRIPTION QUERIES: Please email customerservice@maximumpc.com or call customer service toll-free at 800.274.3421

Maximum PC ISSN: 1522-4279



Waiting for a Windows Renaissance

I've written about Apple's OS X many times before, and it's no secret that I've long been impressed with Apple's operating systems. This month, I reviewed the MacBook Air, which gave me the opportunity to spend some quality time with Apple's latest OS, Leopard, and I had an epiphany: Windows users are in the same exact position that Mac users were in 1999.

Think back to the turn of the century. Windows 2000 was fresh and new. Power users were basking in the glow of a fully 32-bit operating system that supported power-user tasks, playing games, and listening to MP3s. It was a golden age for Windows users, with the promise of an even better version of Windows on the horizon. On the other side of the personal-computing fence, Apple folk were either struggling with the laughably antiquated Mac OS 9 or dealing with the not-ready-for-prime-time first release of OS X, which lacked crucial features like a 2D-accelerated desktop and native versions of popular apps. If you bought a Mac in early 2000, you had to choose between the old and busted OS 9 or the new but premature OS X.

Today, PC purchasers are in a similar situation. On one hand, we have XP. Windows XP isn't quite as old and busted as OS 9 was back then, but it still suffers from security issues and doesn't support the latest and greatest technologies. Then there's Windows Vista. While Vista has definitely improved since launch, I don't think many folks would describe it as a worthy successor to XP—especially people who have to act as tech support for friends and family.

Unfortunately, while Mac users could see the light at the end of the tunnel in 2000, Windows users are currently in limbo. As we went to press, we saw the first public demos of the next version of Windows—code-named Windows 7—and we were underwhelmed. For the sake of our platform, I sincerely hope that Microsoft starts showing us a Windows 7 that will inspire PC users in the same way that OS X inspired Mac users almost a decade ago.

On a completely unrelated note, I'd like to announce that Michael Brown is leaving the confines of the *Maximum PC* offices so that he can scour the PC universe as our Editor at Large. In his new role, Mike will cover a lot of the hardware products he has always reviewed, as well as write about emerging technologies and breaking news. I'm also pleased to announce that we're adding another face to the *Maximum PC* staff. Norman Chan, *PC Gamer's* long-suffering intern, has defected to *Maximum PC* to run our day-to-day web operations. Thanks Mike, and welcome Norm!

Will Smith

READ THIS NOW!

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- **GeForce GTX 280** page 54
- **Create Your Own Webcast** page 64



WRITE TO WILL Please send comments, questions, and stuff with caramel to will@maximumpc.com. Include your full name, city of residence, and phone number with your correspondence. Unfortunately, Will is unable to respond personally to all queries.

THE NEWS

Intel, Nvidia Feud Could Leave PC Enthusiasts Wanting

Thinking about SLI with Intel's next-generation CPU?

Forget about it —GORDON MAH UNG

Is the CPU more important than the GPU? Until now, that's been a topic more suitable for Usenet groups, but this fall, consumers in the market for über rigs might actually be forced to choose between Intel's next-generation Nehalem CPU and Nvidia's SLI.

Although Intel and Nvidia won't comment on whether SLI support will be offered in Intel's upcoming Tylersburg performance chipset or a new Nehalem nForce chipset, a half-dozen PC builders that *Maximum PC* spoke with told us not to expect SLI when Nehalem launches.

"[This situation] really hurts us," said one vendor, who asked to remain anonymous. "If someone wants a Nehalem with two SLI cards, we can't do it. It kind of sucks for system integrators."

The ultimate fear for PC builders is that

**NVIDIA WANTS ENTHUSIASTS
TO BUY ITS OWN
NFORCE SLI CHIPSETS.**

when faced with a choice, consumers won't buy anything. With both companies tossing stink grenades at each other, many OEMs believe that it's not just "cooptation" between Intel and Nvidia, but outright World War III, with enthusiasts caught in the middle.

SLI was originally developed on an Intel chipset, but Nvidia has never supported Intel desktop chipsets with SLI. Nvidia cites validation issues as the reason, but most observers believe it's more of a business decision: Nvidia wants enthusiasts to buy its own nForce SLI chipsets. Which is what anyone who wants Intel and SLI has done. That won't work with Nehalem, which is

incompatible with existing motherboards.

When asked about SLI with Nehalem, Intel spokesman Daniel Snyder said, "Tylersburg will work mechanically and electrically with multiple graphics card solutions." He added that AMD plans to fully support the Nehalem platform with CrossFire X and other vendors could as well if they wanted to. But does Nvidia even have a license to build for Nehalem? Snyder said he could not comment on licensing issues.

Snyder also downplayed any animosity between the two companies. At the end of the day, both companies are constantly cooperating on platforms such as Skulltrail, which supports CrossFire and SLI, he said. He admitted that flames were fanned when a contract employee at a trade show said that discrete graphics would "probably not" be necessary in the future, but that's not Intel's official position.

"We completely expect discrete high-end graphics to be around for the foreseeable future," said Snyder.

Nvidia officials also seem to be ratcheting back the hot talk and said that to describe the situation as World War III is to sensationalize it. "We don't hate Intel," said Nvidia spokesman Brian Burke. "They are experts in the x86 architecture and they're the leader in the CPU. But they're not experts in graphics and they're not the leaders in graphics."

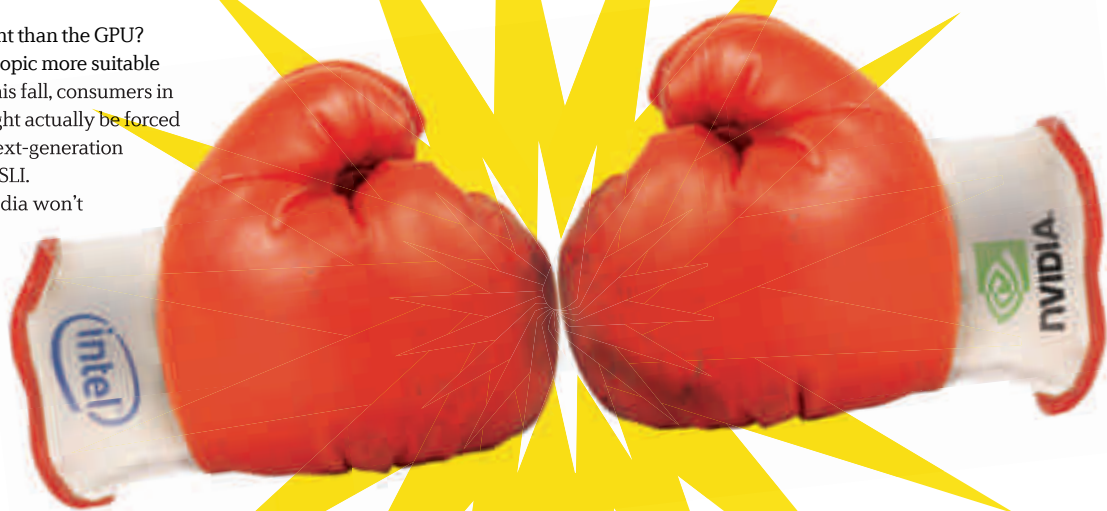
Like Snyder, Burke would not comment on future products but insisted that Nvidia has a license to build chipsets for Nehalem. But what about flipping a switch to allow SLI to run on Intel's Nehalem chipset at launch?

According to Burke, "SLI is not just plugging in two boards, that's not what SLI is.

CrossFire may be that, but we view SLI as the experience and the brand, and we want to protect our brand with an ecosystem that works." He added that how the GPUs interact with the chipset is a very important

part of the equation, so Nvidia's plans to support SLI through an nForce chipset.

In other words, if you want SLI with Intel's next-gen CPU, you'll have to wait and see.



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Blu-ray Blues

Despite cornering the high-def video market, Blu-ray is experiencing scant sales growth, according to the NDP Group. Up until Toshiba ceased pushing the competing HD DVD standard, it was assumed sales were suffering from the format war. But the lack of competition is making very little difference for Blu-ray. Instead, market watchers are seeing new growth in sales of upconverting DVD players, which output standard DVD content to higher resolutions. —KS



FAST FORWARD



TOM HALFHILL

MIDs: PDA 3.0? OMG!

Intel's strategy for Atom processors and WiMAX hinges partly on a new class of handheld computers called mobile Internet devices (MIDs). Larger than cellphones but smaller than subnotebook PCs, MIDs are supposed to make the Internet available anytime, anywhere.

Actually, MIDs aren't new. They're the third major attempt to establish the nebulous product category of personal digital assistants (PDAs).

The first wave of handheld computers broke in the early 1990s. Most were underpowered, clunky tablet-size prototypes that never made it to market. The second wave crested later in the 1990s with Apple's Newton and Palm's initially successful Pilot. They failed to sustain their early popularity when cellphones absorbed most of their functions while adding the crucial ability to communicate.

Today, the few surviving descendants of PDAs are smartphones, such as the RIM BlackBerry, Palm Treo/Centro, and especially Apple's iPhone. They emphasize telephony but also provide email, texting, and web browsing. Generally, they substitute tiny keyboards for the handwriting recognition once considered vital for PDAs.

But smartphones have three problems: input, output, and throughput. Although young people don't mind typing with their thumbs, it gets tiresome, and the most sought-after affluent consumers tend to be Boomers whose eyesight and dexterity are waning. Ditto for output: Smartphone screens are too tiny for comfortable web browsing. And throughput is limited by cellular networks, which need more bandwidth for serious Internet usage.

The MID prototypes I've seen are somewhat larger devices with bigger screens. They have touch screens with better user interfaces, like the iPhone's. WiMAX can blanket wide areas with broadband Internet service, especially when using reassigned analog-TV frequencies.

Critics say that no mobile communications device larger than a cellphone will ever become popular, especially with men, who generally must carry such devices in pockets or belt pouches. Women, of course, have purses. But lately I see more men lugging purse substitutes—briefcases, backpacks, messenger bags, and man bags. If MIDs conveniently combine telephony with universal Internet access, I think people will find a way to carry them. Not long ago, packing a phone everywhere seemed equally impractical.

Tom Halfhill was formerly a senior editor for *Byte* magazine and is now an analyst for *Microprocessor Report*.

Senator Takes War on Terror to YouTube

Lieberman sees video-sharing site as a haven for al-Qaeda recruitment

Senator Joe Lieberman (I-CT) wants YouTube and parent company Google to stop hosting videos he says are produced by terrorist organizations. In a letter to Google chairman Eric Schmidt, Lieberman said, "Searches on YouTube return dozens of videos branded with an icon or logo identifying the videos as the work of... Islamist terrorist organizations. A great majority of these videos document horrific attacks on American soldiers in Iraq or Afghanistan."

On its public policy blog, Google responded that prescreening videos is impossible given the number of clips the site receives but that community policing has been an effective means of ensuring YouTube's terms of service are not



Senator Lieberman wants to rid YouTube of terrorist-sponsored videos. We'd be happy if he purged it of American Idol wannabes.

violated. While YouTube agreed to remove some of the videos Lieberman found suspect, it left others online, explaining, "While we respect and understand his views, YouTube encourages free speech and defends everyone's right to express unpopular points of view. We believe that YouTube is a richer and more relevant platform for users precisely because it hosts a diverse range of views." —TE

NANOTUBES CAUSE CANCER?

Researchers link exposure to mesothelioma

Researchers at the Institute of Occupational Medicine in Edinburgh, Scotland, have published findings that suggest exposure to nanotubes—microscopic tube-like carbon constructs increasingly found in consumer products—can cause a reaction in the human body which is similar to that of asbestos.

The findings are far from conclusive, however. Researchers found the presence of granulomas in mice that had been injected with nanotubes. Granulomas are a precursor to mesothelioma, a type of cancer commonly associated with asbestos exposure. However, because the nanotubes were injected into the mice, not inhaled, it's unclear how serious the risk actually is. Regardless, anyone handling or manufacturing nanotubes should take all necessary precautions—including wearing gloves and a mask to avoid potential exposure. *Maximum PC* also recommends that you refrain from licking or gnawing on your nanotube-laden tennis racket. —WS

Xerox Saves Trees

According to Xerox, two out of every five pages printed in the office are for single, short-term use. Be it notes for a meeting, driving directions to an appointment, or the recipe Aunt Madge emailed you, these temporary uses of paper needn't lead to the senseless destruction of more trees—not now that Xerox has filed a patent for erasable paper. The paper is made of a molecule that changes color when hit with ultraviolet light. The molecule changes back to its original state after 24 hours, or sooner if exposed to heat, after which it can be reused up to 100 times. All that's needed now is the ultraviolet-light-emitting printer. Researchers at PARC (Palo Alto Research Center, Inc.) are currently working on that. —KS

RIAA Retrial

Jammie Thomas, the first person to take an RIAA copyright violation case to court rather than settle, may have won the right to a retrial. In October 2007, Thomas was found guilty of copyright infringement and ordered to pay \$220,000 in damages for making 24 songs available on KaZaA, a peer-to-peer file-sharing site. However, the trial judge, Michael Davis, has determined that a retrial may be in order due to an error made during jury instructions. In the original trial, jurors were told that simply making files available for download constituted copyright infringement. Davis has since reconsidered this decision and believes a third party must actually download files for infringement to take place. A ruling on the issue is expected in July. —TE



Cisco Denies Aiding Censorship in China

Hardware manufacturer Cisco has been called out for allegedly assisting the Chinese government in censoring what its citizens are able to see on the web. An internal Cisco PowerPoint presentation that was leaked to the Associated Press listed the Chinese government's technology goals as "to stop network-related crimes, guarantee the security and services of a public network, and combat Falun Gong evil religion and other hostiles."

Cisco counters that while these may, in fact, be goals of the Chinese government, the company does not assist in censorship in any way and the inclusion of the slide was simply an oversight. In his testimony before Congress, Cisco General Counsel Mark Chandler went on to explain that while Cisco does not modify its products for any government, the company cannot control how certain features are utilized. —TE

GAME THEORY



THOMAS McDONALD

Houser Problems

Watching Grand Theft Auto IV rack up the highest recorded sales in gaming history was one of the most disappointing things I've witnessed in 17-plus years of covering this hobby. (PC gamers should get a crack at the game this fall.) If the gaming press is to be believed, GTA4 is simply the greatest game ever made.

This is utter nonsense, even by the game's own rather warped standards. Putting aside the flaky driving model, clipping problems, and clichéd plot and dialogue, there is a gigantic elephant in the room that the gaming press seems hell-bent on ignoring: the issue of morality. It's like we're afraid to acknowledge the rancid, misogynistic ethics of GTA4 because we might give aid and comfort to those who want to control or suppress the freedom of game designers to create. Tough luck. This is simply a vile game utterly lacking any recognizably human moral context.

As Warren Spector, the man behind Deus Ex, recently observed, "GTA is the ultimate urban thuggery simulation, and you can't take a step back from that... I am frustrated that the games in the GTA series, some of the finest combinations of pure game design and commercial appeal, offer a fictional package that makes them difficult to hold up as examples of what our medium is capable of achieving."

Exactly right. DePalma's *Scarface* has a stronger sense of right and wrong, and *The Sopranos* is positively conservative by comparison. Like it or not, there is a difference between what movies and games can get away with. *The Sopranos* is a drama in which the viewer is a passive observer. In GTA, the character is under your control: The choices are yours. That distinction matters.

Go on YouTube and check out IGN's "GTA4 Sex" video, and then imagine it projected on the screen before the Congressional Subcommittee on Sticking Our Noses in Other People's Business. Dan and Sam Houser have given the government the gun it's going to use to put a bullet in the brainpan of the gaming industry.

Why the hell are we defending them?

Thomas L. McDonald has been covering games for 17 years. He is an editor at large for *Games* magazine.

First Look

Ballmer and Gates Unveil Windows 7

iPhone-style multi-touch support confirmed for the next version of Windows

At the *Wall Street Journal's* D conference, Bill Gates and Steve Ballmer offered a first tantalizing look at Windows 7—the next version of Windows. We haven't seen the full UI yet, just glimpses of future functionality, including iPhone-style multi-touch control and a radial menu.

The multi-touch functionality that Ballmer and Gates demoed on a Dell Latitude XT laptop looked remarkably similar to the Microsoft Surface, the tabletop computer Microsoft is developing for information kiosks and hotel lobbies. In addition to a Surface-esque photo-management app, they demoed an onscreen piano, a multi-touch paint app, and an impressive mapping app, which featured radial menus.

Radial menus are essentially mouse gestures that use visual guides to help the user navigate more complex menus. Until now, we haven't seen this power-user feature in mainstream apps, aside from a few games and browser plugins. It's much too early to start judging Windows 7—rumor is, it will be released in late 2009 or early 2010, at the soonest—but we're happy to see anything new from Microsoft. **-ws**



Windows 7's radial menus will take the place of nested drop-down menus.



Windows 7's photo browser bears a striking resemblance to the Surface demos we saw last year.

BYTE RIGHTS



QUINN NORTON

Know Your Term Limits

Copyright expiration seems to be out there in the distant future, along with flying cars and giant Tokyo-destroying robots. It takes so long for works to pass into the public domain in the United States that waiting for them seems futile, unless you're a big fan of silent movies and barbershop quartets. But this situation isn't universal. The international law on copyright, aka the Berne Convention, lets countries set shorter limits.

Some are as short as 50 years, so just most of you will be dead or too old to care when this column enters the public domain in Argentina. All of you will be dead (or at least have your heads frozen) when it does so in the U.S.

Go ahead, I give you my permission—take my column in 2058. Screw 2103.

Long terms are silliest in software. Microsoft gets to keep making mad money from its first DOS for 68 more years. Right now, America's only term-expired computer program was probably written by Ada Lovelace.

There's a growing collection of public domain works online these days hosted in shorter-term countries all over the world. Project Gutenberg, Librivox, and the Internet Archive all store content outside the U.S. that is still copyrighted here, but a search can land you in Australia violating U.S. copyright without you ever knowing it. F. Scott Fitzgerald, anyone? Google, it seems, has borne us back ceaselessly into the past.

But what should copyright actually be? Who does better, the longer or the shorter term countries?

Rufus Pollock, a Cambridge University economist, actually ran the numbers on optimal copyright. He sat down to find out what period gave creators enough time to make a living and provided society with the best benefit. It turned out to be 14 years, the same term America started out with in 1790. Seems the founding fathers were pretty smart after all.

Another paper from Cornell University made a public benefit argument for infinite copyright—but with re-registration every 15 years, putting everything but the most profitable works in the public domain. Disney could have Mickey Mouse—I wanted Galaga more, anyway.

Quinn Norton writes about copyright for *Wired News* and other publications. Her work has ranged from legal journalism to the inner life of pirate organizations.

GAME ON

Valve Announces Steam Enhancements

Steam, Valve's popular digital distribution platform for games, is about to get a host of new features, including online storage and syncing for your save games and a system requirements checker.

The Steam Cloud is by far the most exciting enhancement. The cloud will store your save games and configuration info on Steam's servers, allowing you to access your personal settings from any computer that's logged into Steam. For anyone who games on more than one PC, this is a killer feature—you won't have to root around in your Steam folder to find saved games anymore. Unfortunately, Steam Cloud will work only on games designed for it—Valve expects *Left 4 Dead* to be the first new title to support the Cloud.

Also announced was a system requirements tester, which will compare your system to the massive database of system configurations collected in the Steam hardware survey to determine what kind of performance you can expect from your rig for any given title in the Steam library. **-ws**

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THE LIST

8 Ways We'd Fix PC Gaming

8 KEEP US BUSY

Give PC gamers something to do online while we're at work wishing we were playing your game.

7 MORE ZOMBIES, FEWER NAZIS



6 MORE CASUAL GAMES

Peggle, Everyday Shooter, and World of Goo are awesome, but we want more games we can pick up, play for 10 minutes, and then put down!



4 INNOVATE ON THE PC

Not every game needs to be a blockbuster; the PC is the perfect platform for testing new game designs and game-play ideas.

5 MAKE GAMES SCALE BETTER

Making games look killer on high-end hardware isn't an excuse to ignore low-end machines.

3 FUN CROSS-PLATFORM SUPPORT

We like playing with our Xbox pals, but don't cripple the PC version of a game with the consoles' shortcomings.

2 RELEASE GAMES WHEN THEY'RE DONE

Spending \$50 on a game that just won't work sucks.

#1 SOLVE THE PIRACY PROBLEM

Don't punish paying customers with oppressive copy protection—add features that require a legit copy of the game!



photo courtesy of Flickr user Michi1308
<http://tinyurl.com/5yffma>

in a store.” The spokesperson said this doesn’t apply to all versions though—for software downloaded directly from the website, the clock starts on the purchase date. Louis said he purchased the three-pack locally, so that’s not what occurred. “The update process should not take away any time from his subscription. And submitting a rebate would definitely not alter his subscription date either,” the rep explained.

The spokesperson said the company has not received reports of this happening to other customers. “We try to be as transparent as possible in all of our practices and by no means would we intentionally do anything that was duplicitous. Fortunately, our customer service resolved this issue directly with the

arrived without a remote. He thought the description on the website indicated a remote would come with it, so he asked me to take a look at the website. I thought the product description was ambiguous, so I pinged Provantage about the remote and whether it was OEM or retail packaged. To make a long story short, a customer service rep told me it did come with a remote and that it was retail boxed. The package my girlfriend’s father received was OEM and came with a driver disc and card—no remote. My girlfriend’s father didn’t want to bother with trying to fight for a return or the remote, so I left it at that. But I think it’s wrong for a company to tell you a product comes with



Apparently, not every All-in-Wonder Radeon 7500 card comes with a remote.

WE PROCESS THOUSANDS OF ORDERS PER DAY, AND WE CANNOT HIT A HOME RUN EVERY TIME....

customer, but we do want to make sure it doesn’t happen to anyone else.”

Since some details of what exactly happened in Louis’s case aren’t clear, the rep offered to contact him to try to discover what could have happened.

The lesson to be learned from this is that you need to track your subscriptions—don’t assume companies will do it for you.

Almost Everything in Wonder

This one is a little complicated, but here’s what happened: My girlfriend bought an AMD All-in-Wonder 7500 AGP card from Provantage.com for her father, but it

something and then not include it. Provantage.com is definitely not a company I would recommend to anyone who works hard for his or her money.

—Zachary Cothran

The Dog spoke with a Provantage spokesperson who said, “We did accidentally provide erroneous information to the customer, which happens on occasion. We process thousands of orders per day, and we cannot hit a home run every time, although we give our best effort to do so. Had the customer been dissatisfied with what was received and we were notified that they were shipped the wrong product, we would have gladly

made it right. Unfortunately, we were not contacted, but Maximum PC’s Watchdog was. Provantage has been around since 1984 and one thing will never change: Customer mistakes happen. We do our best to correct any errors, but if we do not know they happen, there is nothing we can do to make it right.”

The spokesperson said a contributing factor to the confusion may have come from the fact that Zach’s girlfriend ordered the part under her name and Zachary made the inquiry separately, so customer service would never have connected the two.

He also said that the customer service reps aren’t near the products, so they can’t check what’s in the box. The spokesperson said that if Zach’s girlfriend wanted the version with the remote, she could return the card and purchase a retail-packaged one, which includes a remote. ⏻



EMAIL THE WATCHDOG If you feel you’ve gotten a raw deal and need assistance setting a vendor straight, email the Dog at watchdog@maximumpc.com. Please include a detailed explanation of your problem as well as any correspondence you have sent concerning the issue.



MacBooks have become the darlings of the computer press. They're capturing the attention of first-time notebook buyers and even converting a growing number of long-time PC owners who are looking for that elusive "perfect" mobile computer. A report on recent notebook sales figures reflects the MacBook's momentum. Findings by market research firm the NDP Group show that brick-and-mortar sales of Apple notebooks experienced a 50 to 60 percent growth in the first quarter of 2008, while Windows notebook sales remained flat. In the premium notebook category—encompassing machines costing \$1,000 or more—Apple now claims a whopping 64 percent market share.

But are these slick hipster notebooks worth the hype and their spendy price tags? What do you really get for the money when you throw down for a MacBook, and how do these Apple computers compare to their PC counterparts in terms of performance, features, overall usability, and price? *Maximum PC* tests and reviews the MacBook Air, the standard MacBook, and the MacBook Pro against five PC models sporting similar price points and formfactors. It's time we set the record straight.

BY THE MAXIMUM PC STAFF

From the Air to the Pro, Apple's MacBooks are winning the hearts and minds of consumers everywhere—including PC enthusiasts. *Maximum PC* investigates whether the hoopla is warranted

Can Apple's Best Top the PC Co



ple
mpetition?

Categorical Differences

Apple's presence in the notebook market spans three distinct classes. Here's how we define them and the key features we think each class demands



ULTRAPORTABLE

- Maximum 4 lbs. lap weight
- 11- to 13-inch screen
- Minimum 4-hour battery life
- Transflective screen surface
- Real keyboard
- Video output
- ExpressCard slot
- Optical drive (optional)

MAINSTREAM

- Affordable
- Dual-core processor
- 160GB or more storage capacity
- Maximum 7 lbs. lap weight
- 13- to 15-inch screen
- Optical drive
- Appropriate expansion slots

PROFESSIONAL

- Dual-core processor
- Discrete graphics
- 15-inch or larger screen
- Maximum 8 lbs. lap weight
- Appropriate expansion slots
- Robust video-out
- DVD burner

Our Testing Strategy

Evaluating a notebook is very different from evaluating a desktop PC

A notebook PC isn't like a desktop rig. Tricked out, water cooled, and overclocked like a mutha, your Guns of Navarone desktop rig will live a life that's similar to your mom's PC: sitting safely underneath your desk. And while you can freely upgrade your PC's peripherals—its keyboard, monitor, and mouse—a notebook is everything it's ever going to be the first day you get it. The trackpad can't be replaced nor can the LCD screen. If the mushy keyboard annoys you, tough luck.

So our reviews of these notebooks focus on not only performance but also usability and price.

USABILITY

This is a crucial factor in a notebook's success. It includes the keyboard's feel, the placement of the trackpad, the number and variety of ports, the machine's weight and size, the thermals, the quality of the screen,

as well as the overall look and feel. It's a lengthy list of review points, which explains why usability figures so prominently in our final assessment.

PERFORMANCE

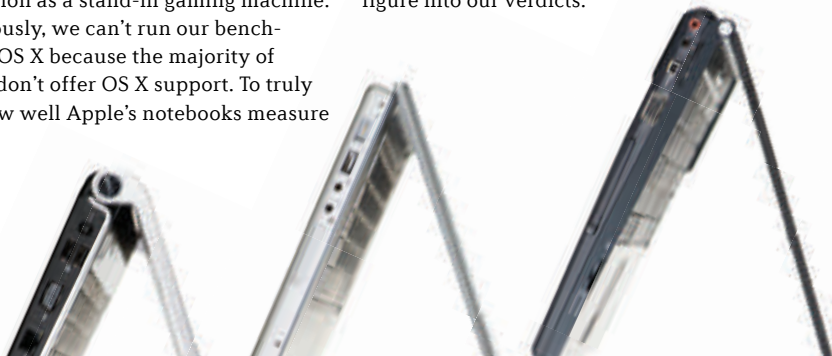
Don't get us wrong—performance matters. Unless your activities are strictly confined to Microsoft Office and Firefox, you're going to notice when, for example, it takes five minutes to enact a simple photo edit. To test a notebook's performance, we look to our standard suite of desktop benchmarks, which stress video editing and encoding, photo editing, and slide-show creation. We also run two older games at moderate resolutions to see if a notebook will function as a stand-in gaming machine.

Obviously, we can't run our benchmarks in OS X because the majority of our tests don't offer OS X support. To truly assess how well Apple's notebooks measure

up as PCs, we dual-booted the MacBooks into Windows Vista Home Premium and ran the benchmarks in that OS—for an apples-to-apples comparison among all models. (To get a sense of the performance difference between a MacBook running OS X vs. Vista, see page 43, where we show the results of tests using apps that are native to both OSes.)

PRICE

The Mac has historically been at a price disadvantage to the PC, but is this still the case today? Read on and you'll see how these x86 Macs stack up in terms of specs and price. While not quite as important as performance and usability, price will also figure into our verdicts.



Apple MacBook Air

The smallest notebook we've ever tested comes with sacrifices

Without a doubt, this is one of the niftiest-looking laptops we've ever tested. At 3 pounds and just one inch thick, it's slightly smaller than Toshiba's R500 (reviewed November 2007). But while the R500 was a capable, fully-featured portable PC, the MacBook Air makes serious compromises to maintain its petite profile.

The most obvious sacrifice is the Air's lack of an optical drive—something other ultraportables, including the similarly svelte R500, manage to include. To compensate for this lack, Apple provides a utility that lets you use an optical drive on another PC or Mac across a network. Performance left something to be desired, but we were impressed that the feature worked at all.

Unfortunately, the optical drive isn't the Air's biggest omission. We're even more put off by this portable's dearth of external ports—it includes just a single



A couple extra ports would make this gorgeous piece of hardware even more attractive.

USB port, a multi-format video-out, and a headphone jack. No mic, no PC Card, no modem, no Ethernet—enjoy waiting for a multi-gigabyte file transfer using the Air's 802.11n Wi-Fi.

MACBOOK AIR
 \$1,800, www.apple.com

VERDICT
7

The Air doesn't, however, compromise in terms of performance. While the Air came in last in most of our benchmarks, it's more than fast enough for typical desktop-application use. We wouldn't want to convert 5GB of photos from RAW with it, but for browsing the web, watching movies, and checking email, it's plenty sufficient.

With an Ethernet port and a couple more USB ports, this would be a killer laptop. **—ws**

SPECIFICATIONS

CPU	Intel Core 2 Duo (1.60GHz)
RAM	2GB DDR2/667
HARD DRIVE	80GB, 4,200rpm
SCREEN	13.3-inch LED-backlit LCD (1280x800)
LAP/CARRY WEIGHT	3 lbs./3 lbs. 6 oz.

Sony Vaio SZ Premium

It looks more substantial than the MacBook Air, but is just as flawed

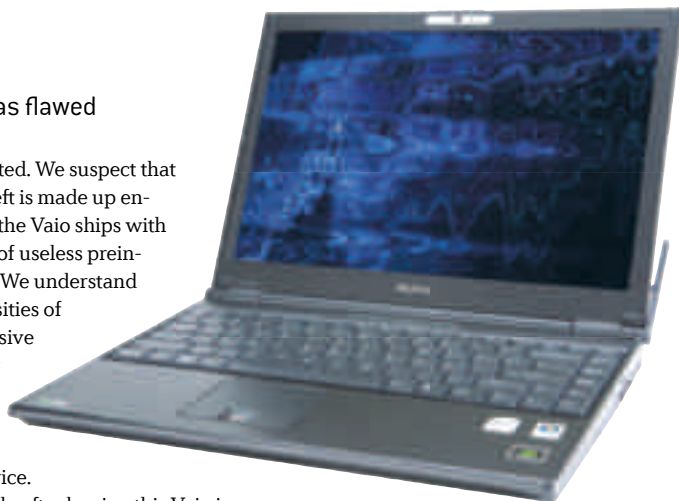
Weighing a tad more than 4 pounds, Sony's Vaio SX is the heftiest laptop in the ultraportable category. Yet despite its larger size, the Vaio isn't the sturdiest small-size contender. That's too bad because this little rig packs killer performance in its sexy carbon-fiber shell—it's the only ultraportable we tested that includes discrete graphics.

The Vaio delivered great benchmark numbers—and thanks to its GeForce 8400M GS videocard, it's the only ultraportable that even ran our gaming benchmarks. And unlike other machines we've tested, killer performance didn't impact battery life; the Vaio ran our movie playback test for more than three hours.

We're also fond of the Vaio's Rev A Sprint EVDO card. It perfectly complements the 802.11a/b/g/n Wi-Fi, gigabit Ethernet, and Bluetooth options. The Vaio also accommodates both PCMCIA and ExpressCard/34 cards, if you'd rather use your own WAN card.

On the other hand, the Vaio's trackpad is too damn small, and the machine feels flimsy

and poorly constructed. We suspect that its extra pound of heft is made up entirely of crapware—the Vaio ships with a ludicrous number of useless preinstalled applications. We understand the economic necessities of subsidizing inexpensive PCs with third-party crapware, but there's no excuse for whoring out a notebook of this price. The first thing we'd do after buying this Vaio is reinstall Windows. **—ws**



With a sexy carbon-fiber chassis, discrete graphics, and three-plus hours of battery life, the Vaio looked poised to take the ultraportable crown. So what happened?

SPECIFICATIONS

CPU	Intel Core 2 Duo T9300 (2.50GHz)
RAM	4GB DDR2/667
HARD DRIVE	250GB, 5,400rpm
SCREEN	13.3-inch LED-backlit LCD (1280x800)
LAP/CARRY WEIGHT	4 lbs./4 lbs. 13 oz.

SONY VAIO SZ PREMIUM
 \$2,500, www.sony.com

VERDICT
7

Lenovo ThinkPad X300

Proof you can have your 3-pound cake and eat it too

When you pick up a Lenovo ThinkPad X300, you pick up 3 pounds, 6 ounces of excellence. In every way that the MacBook Air is stylish and beautiful, the X300 is built to perform. No usability is sacrificed for visual appeal—inside this unassuming black chassis is a workhorse. It sounds like an oxymoron, but this is one sturdy 3-pound portable.

The ThinkPad held its own in most of our benchmarks and excelled in battery life as well as the Photoshop and Premiere tests. Overall, however, it was bested by Sony's Vaio, which has double the memory and a 1.3GHz-faster CPU. The ThinkPad is the only rig in our roundup with a solid-state drive, but we didn't see any huge performance gains as a result. Unlike the Air, which includes SSD as an option, it's a non-negotiable feature of the X300. We're not convinced that SSD is ready for mass consumption yet, but there's something liberating about storing your data on a drive with no moving parts.

When it comes to usability, the X300 really shines. With the SSD drive, we don't hesitate to pick up a still-running laptop, whether it's to carry it down the hall for a meeting or to chuck it in our bag to go home. The full-size keyboard makes for the best typing experience in the ultraportable field. It's not as comfortable as a real desktop keyboard, but it's darn close. And while we think the touchpad on this notebook is too small, it's augmented with an oversize pointing nub. If you use the two together, you get a good mix of fine and granular control. Best of all, in our real-world testing, we got nearly five hours of life on a single battery charge and just over three hours with our video playback test.

While the Vaio's software bundle is at best an annoyance and at worst a liability, the X300's adds value. Its nerd-friendly software lets you easily tie power profiles

What the X300 lacks in looks and heft it makes up for in performance.

to your location, as determined by your network connection. This allows you to set access and battery conservation rules automatically when you change location. We also love the detailed battery diagnostics, which expose everything you'd ever want to know about your laptop's battery, as well as the extremely fine control Lenovo gives you over every aspect of the X300's power-management facilities.

A few significant flaws preclude the X300 from earning a Kick Ass award. The

LED-backlit screen's anti-glare coating is eminently practical, and we love the extra pixels the 1440x900 resolution gives us, but the display is a little *meh*. Colors appeared washed out, and we longed for more brightness. We also wish that the X300 was available with a more cost-effective traditional hard drive. We appreciate SSD as an option, but the small capacity and high price aren't right for everyone. The X300 also lacks a few key connection options—expansion card slots, a media reader, any digital video outputs. While the integrated EVDO obviates one of the most common expansion card slots, we wish there was at least an ExpressCard/34 slot.

And, yes, the X300 includes an optical drive. —WS

SPECIFICATIONS

CPU	Intel Core 2 Duo SL7100 (1.2GHz)
RAM	2GB DDR2/667
HARD DRIVE	64GB SSD
SCREEN	13.3-inch LED-backlit LCD (1440x900)
LAP/CARRY WEIGHT	3 lbs. 6 oz./4 lbs.

LENOVO THINKPAD X300
\$3,600, www.lenovo.com

VERDICT

9



Best in Class: Ultraportable

Not too big and not too small, the ThinkPad X300 delivers the perfect balance of performance and size in a killer package

After running the benchmarks, crunching the numbers, and spending days doing usability testing the old-fashioned way—using the laptops in real-world situations—we decided that of the three ultraportable machines tested here, the one we'd buy with our own money is the Lenovo ThinkPad X300. Even though you can buy two MacBook Airs for what this ThinkPad cost.

The decision in this category ultimately came down to survivability and usability. Both the Sony Vaio and MacBook Air seemed fragile, and we worried about their ability to withstand the wear and tear of heavy use. The ThinkPad feels sturdier than laptops twice its weight, and its SSD drive should deliver better survivability than the old-school spindles and heads in the other two machines. Unfortunately, that SSD also adds at least a grand to the X300's price,

which is a huge premium to pay if your idea of high-risk computing is balancing the machine on one knee while you veg out in front of the tube during Shark Week. Lenovo desperately needs to add a budget X300 using standard hard drives.

The ThinkPad's screen might not shine like those of its glossy-paneled competition, but it actually makes the notebook far more versatile. When we took all three of the ultraportable models outdoors, only the X300 remained usable—turns out there's something to be said for the screen's dowdy anti-glare coating, which is not an option with the Air and Vaio. Add to that the X300's comfortable keyboard and plethora of input options and you have a solid all-around offering. Sure, it could stand a few more inputs and outputs, but with three USB ports we're satiated.

Performance is less crucial in the ultra-

portable category, but the ThinkPad delivered more than respectable scores in most of our benchmarks, losing to the Sony by a smaller margin than we expected, given the differences in hardware. We're especially impressed with the X300's Photoshop results, which show the read benefits SSD users can expect.

That said, none of these laptops is bad—if you don't mind dealing with the abundance of crapware on the Vaio, that is. Folks shopping for a relatively inexpensive 3-pound laptop will find the MacBook Air to be a stunning value at \$1,800. We'd never advocate using it as your only PC, but as a mobile option it's pretty compelling. The Sony Vaio delivers impressive performance, but we'd expect more solid build quality for the \$2,600 price. —ws

BENCHMARKS

	Apple MacBook Air	Sony Vaio SZ Premium	Lenovo ThinkPad X300
Premiere Pro CS3 (min:sec)	59:21	47:22	59:01
Photoshop CS3 (min:sec)	6:07	3:08	5:36
ProShow (min:sec)	95:11	35:44	63:25
MainConcept (min:sec)	174:11	59:52	119:36
FEAR (fps)	WNR	WNR	WNR
Quake 4 (fps)	WNR	WNR	WNR
Battery Rundown (hrs:min)	2:39	3:02	3:01

Best scores are bolded.

Apple MacBook

An elegant solution for simple processing

Apple's little white wonder of a MacBook excels against its PC counterparts, but it's no Gandalf. As expected, gaming is this laptop's weakest link. And even complex multimedia tasks can cause the MacBook's magic to wither.

Still, in most applications, the Vista-booting MacBook performed admirably. But as speedy as the MacBook's 2.1GHz Penryn processor may be, the notebook's fatal flaw—beyond the gameplay-breaking integrated graphics—is a paltry 1GB of DDR2 RAM. This was most evident in our Photoshop test, where the once-mighty MacBook lurched to a crawl.

The MacBook's 13.3-inch glossy screen presents a perceptibly higher quality picture than the other laptops in its class, but not outdoors—you can't see jack in the sunlight. We enjoyed running our fingers across the spacious keyboard, although



The MacBook's touchpad is the largest of any notebook in its class. Now if only it came with two mouse buttons....

SPECIFICATIONS

CPU	Intel Core 2 Duo T8100 (2.1GHz)
RAM	1GB DDR2/667
HARD DRIVE	120GB, 5,400rpm
SCREEN	13.3-inch glossy TFT (1280x800)
LAP/CARRY WEIGHT	4 lbs. 15 oz./5 lbs. 12 oz.

many of the strokes we take for granted on a PC have to be relearned on Apple hardware. Bringing up a context menu isn't a simple right-click affair but rather a three-button ordeal.

Since Apple products are often touted for their multimedia capabilities, the MacBook's limited connection options are a disappointment. Two USB ports and a single FireWire port butt up against a mini-DVI output for external monitor connectivity—adapter not included. Perhaps Apple means multimedia *watching*, as the device's Superman of a battery and easy portability are a perfect fit for an on-the-go lifestyle. —DM

	VERDICT	7
MACBOOK \$1,100, www.apple.com		

Asus F8Sn

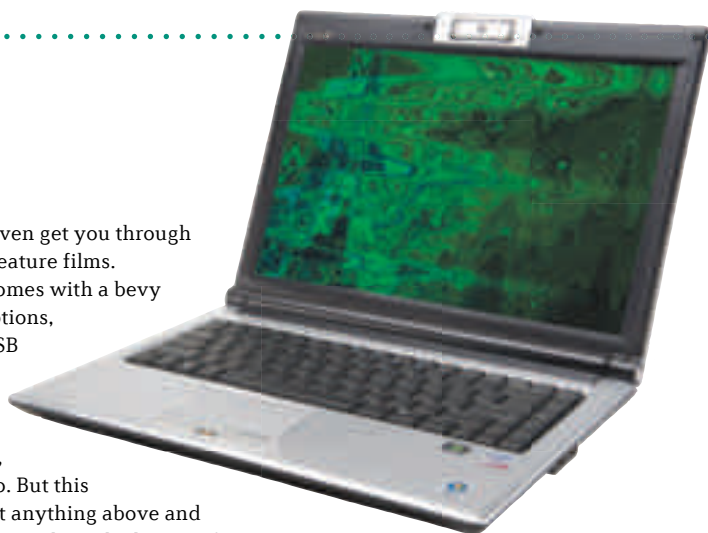
One videocard, one hour, one dead laptop

Asus has gambled the farm that the fancy graphics offering—an Nvidia 9500M GS videocard with 512MB of onboard memory—in its F8Sn notebook will be enough to eclipse the machine's myriad shortcomings. Sadly, it isn't.

While the notebook's Quake 4 performance knocked our socks off, the Asus F8Sn returns frame rates that are just borderline playable in FEAR. This still puts the F8Sn ahead of the other notebooks in its class for gaming, but its lackluster 1.83GHz Core 2 Duo processor was no match for our other benchmarks. And the battery life on

the F8Sn won't even get you through most of today's feature films.

The laptop comes with a bevy of connection options, including five USB ports, a mini-FireWire port, and outputs for VGA, DVI, and S-Video. But this doesn't represent anything above and beyond the norm. We hate the layout of the laptop's keys, as we kept inadvertently hitting a poorly placed function key in the lower-left corner instead of the usual Control key. The notebook's crisp display works in the summer sun, but the reflection can be a bit too much to bear at times.



You only get five hotkeys on the F8Sn's keyboard, and only four are useful.

SPECIFICATIONS

CPU	Intel Core 2 Duo T5450 (1.83GHz)
RAM	3GB DDR2/667
HARD DRIVE	250GB, 5,400rpm
SCREEN	14.1-inch glossy (1280x800)
LAP/CARRY WEIGHT	5 lbs. 11 oz./6 lbs. 11 oz.

	VERDICT	5
ASUS F8SN \$1,030, www.asus.com		

In the end, this notebook lacks anything that sets it apart from the other offerings. Don't let the gaming performance fool you: The F8Sn is a poor choice for users of all shapes and sizes. —DM

Acer TravelMate 5720

A jackrabbit of all trades

With a 15.4-inch screen, Acer's TravelMate 5720 skirts the edge of what qualifies as a mainstream notebook. But at 7.5 lbs. of carry weight, it's still pleasantly portable for a device that offers respectable multimedia and gaming functionality with a good-size battery.

The TravelMate didn't ace our benchmark tests across the board, but it put up a strong showing. You won't be able to max out next-generation games, but the rig holds its own in older titles.

The laptop's 15 frames

per second in our FEAR test makes for a "playable" experience, but we

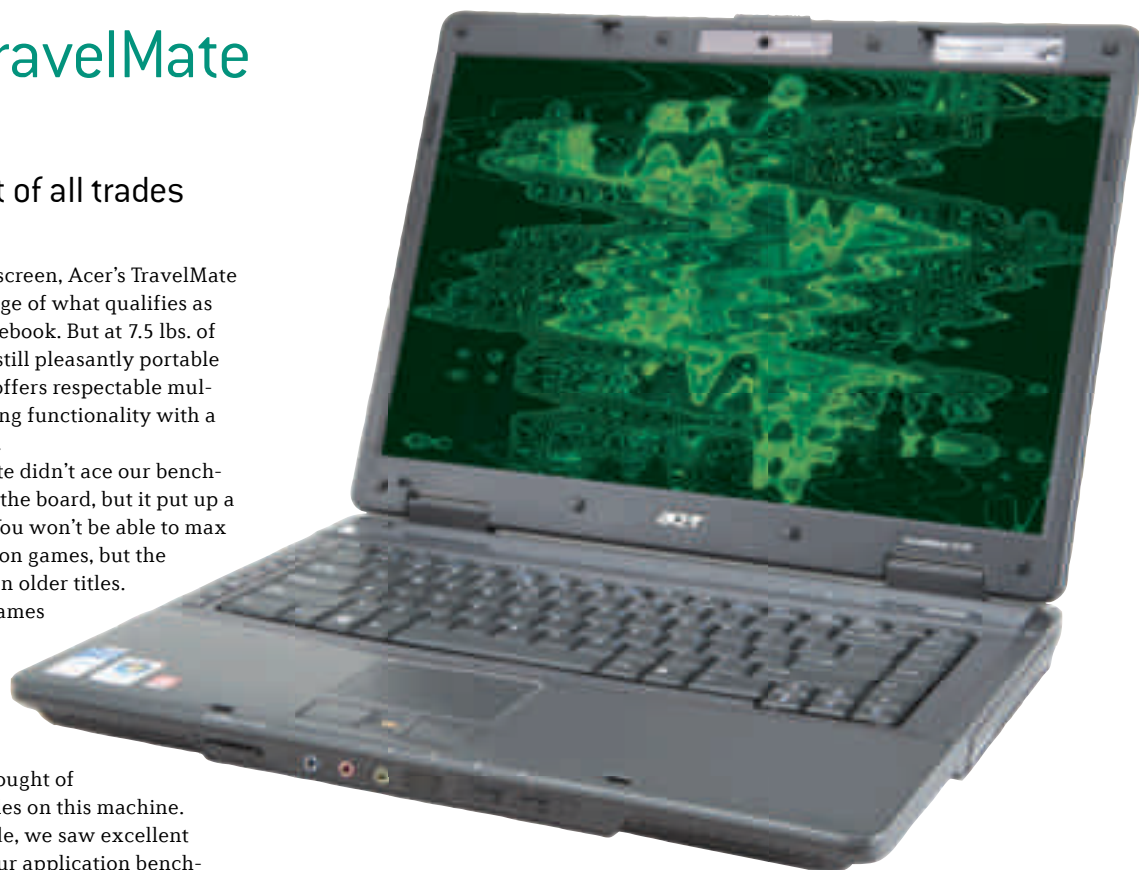
shudder at the thought of playing newer titles on this machine.

On the flip side, we saw excellent performance in our application benchmarks. ProShow and MainConcept encodes sped by, both coming within minutes of faster mainstream models we've reviewed. For this you can thank the 2.2GHz Core 2 Duo processor: That's a speedy clock for the laptop's size, and the CPU's 4MB of L2 cache helps the TravelMate nail these two encoding benchmarks.

Also aiding the laptop's performance are two gigabytes of DDR2 RAM. They pushed the TravelMate to peak performance on our Premiere and Photoshop tests. On the former, encoding ran smoothly and quickly, but it was in our intensive Photoshop script that the memory proved its mettle. The Acer sailed through both tasks, pushing out times that were twice as fast as those of a comparable laptop sporting just one gig of RAM.

The TravelMate's battery isn't the best we've seen, but we appreciate its performance-to-battery-life ratio. With a two-and-a-half-hour time in our rundown test, this laptop should make it through a typical feature-length film before dying out—more, if you reduce the display to its lowest brightness setting.

We love the responsiveness of this laptop's keyboard. Pressing the keys feels almost like using a desktop keyboard.



Beneath the hood of Acer's TravelMate is a 2.2GHz Core 2 Duo processor and 2GB of DDR2 RAM.

Function-key hotkeys allow you to pull up your laptop specs and power-management settings at the touch of a button, and you can launch full applications with the laptop's seven hotkeys.

It's not a perfect experience, but the laptop's screen holds its own in outdoor use. Even with the sun beating down on the TravelMate, we were able to see a decent picture with no reflections or annoyances—aside from the glare. Just don't expect to store much on this machine. While acceptable for this class, we'd prefer a hard drive a bit bigger than 160GB.

The TravelMate's external connection

options are numerous. You get five USB ports and a single mini-FireWire out, as well as a trifecta of video output options: VGA, DVI, and S-Video. The laptop even comes with a built-in SD card reader.

We question Acer's OS choice though. Since the TravelMate comes with Vista Business, not Home Premium, it lacks multimedia functionality like Windows Media Center and DVD Maker as well as the ability to create high-definition movies in Windows Movie Maker. In place of that, you get Windows Complete PC Backup and Restore—a program that's rendered irrelevant by Acer's inclusion of the NTI Shadow backup application.

Minus this lapse, the TravelMate is a strong laptop choice. It presents the best mix of gaming and application performance without suffering critical flaws in either, and its usability and battery life help sweeten the deal. —DM

SPECIFICATIONS

CPU	Intel Core 2 Duo T7500 (2.2GHz)
RAM	2GB DDR2/667
HARD DRIVE	160GB, 5,400rpm
SCREEN	15.4-inch TFT (1280x800)
LAP/CARRY WEIGHT	6 lbs. 9 oz./7 lbs. 11 oz.

ACER TRAVELMATE 5720
\$1,050, www.acer.com

VERDICT

8

Best in Class: Mainstream

The MacBook wins the sprint but loses the marathon

If laptops were dogs, we'd award Acer's TravelMate Best in Show. The MacBook may be the cute dog that's the crowd favorite, but its refusal to obey commands cost it points. And the Asus F8Sn would be stuck in its crate in the back doing the one thing it can do right: spin in a circle.

Things would be different if we looked at just a single category. Take gaming, for example. Hands down, the F8Sn crushes the other contenders with its built-in GeForce 9500M GS videocard. The TravelMate's discrete graphics are no match for the F8Sn's performance, and the MacBook—well, four frames per second in a game like FEAR is downright shameful, solidifying the white laptop's standing as a gamer's foe.

But the F8Sn's gaming prowess comes at a great cost. To keep the machine affordable, Asus includes a paltry 1.83GHz Core 2 Duo CPU. Thus, the other laptops in this category speed past the F8Sn in nearly every other

non-gaming benchmark. And worse, the F8Sn's mighty graphics card sucks the battery life during normal use.

While the MacBook owns the competition in a few of our encoding benchmarks, thanks to its nifty Penryn processor, the notebook falls flat on more memory-intensive tests. The single gigabyte of DDR2 RAM proves to be this laptop's undoing once video conversion and high-definition picture processing come into play. Still, the MacBook achieves nearly three hours of battery life—a full 20 minutes more than Acer's TravelMate.

So how does one decide a clear victor? It's not easy. Each laptop comes with little bits and pieces that we'd like to see changed: the TravelMate's 160GB hard drive and inclusion of Windows Vista Business, the F8Sn's horrific processor speed and lackluster battery life, the MacBook's lack of external connection options and poor gaming performance. But at this price point, the midrange laptop

class is all about sacrifices. You're not going to find a perfect notebook in this cohort, but you can definitely find one that includes most of the qualities you're seeking.

In that sense, the TravelMate comes out on top by a wide margin, mostly because you don't have to sacrifice a great deal of performance to get what you want. Its gaming prowess isn't the best we've seen, but the laptop holds its own in our benchmarks without crushing the machine's overall battery life. Its application performance rivals the MacBook's best, and we'd much rather have the extra 40GB of hard drive space, faster Premiere and Photoshop times, and larger display—not to mention the external connection options, where the TravelMate far exceeds the MacBook's limited offerings.

When it comes to mainstream notebooks, we'd happily take Acer's TravelMate on the road any day of the week. But if someone gave us a MacBook, we wouldn't complain—we can't say the same about Asus's F8Sn. —DM

BENCHMARKS

	Apple MacBook	Asus F8Sn	Acer TravelMate 5720
Premiere Pro CS3 (min:sec)	38:43	48:38	35:59
Photoshop CS3 (min:sec)	5:48	4:12	3:53
ProShow (min:sec)	38:10	56:53	40:32
MainConcept (min:sec)	68:11	83:10	68:08
FEAR (fps)	4	22	15
Quake 4 (fps)	10.3	79.2	29
Battery Rundown (hrs:min)	3:26	1:42	2:32

Best scores are bolded.

Apple MacBook Pro

Even diehard PC users will be wowed by this portable's specs

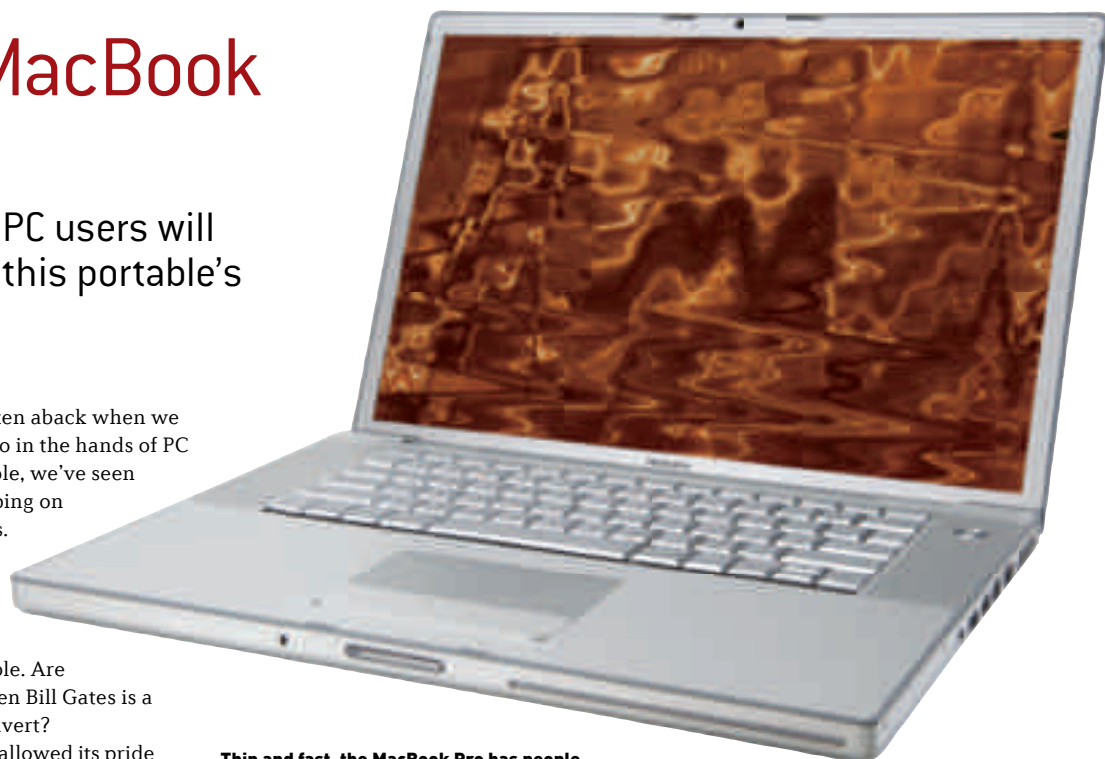
We're always a little taken aback when we see Apple's MacBook Pro in the hands of PC power users. For example, we've seen PC game developers typing on MBPs at industry events. And at trade shows, it isn't uncommon to see Windows app developers sporting Apple's pro-class portable. Are we far from the day when Bill Gates is a proud MacBook Pro convert?

Ever since Apple swallowed its pride and embraced the x86 instruction set used by every other PC, its computers have been far more compelling given their ability to run a Windows OS directly on the metal without emulation. Of course, most MBP users will probably go OS X, but having the Windows fallback for gaming and application fidelity is a comfort—no other PC vendor can currently offer that OS combo.

Wrapped in an aluminum shell, the MacBook Pro's thinness is impressive next to other notebooks in its class. Dell's XPS M1530 (reviewed on the next page), for example, feels downright chubby in our hands. We've seen other notebooks that come close to the MBP in thinness, but graphics are usually compromised to get there. For example, we had a hard time finding another notebook in the MBP's class that sports a GeForce 8600M GT with a 512MB frame buffer. Most other superslim notebooks resort to integrated graphics—and even Dell's loaded-for-bear XPS has just half the frame buffer.

The MBP's CPU is also top-notch: Intel's 2.5GHz Core 2 Duo T9300 chip. This 45nm-based Penryn CPU is just a step away from Intel's fastest mobile CPU, the 2.6GHz C2D. A 250GB SATA drive, slot-fed DVD burner, and 2GB of DDR2/667 make up the rest of the notebook's specs.

But specs aren't the full story. The MBP



Thin and fast, the MacBook Pro has people making the switch.

includes some really nice extra touches, such as a backlit keyboard that's connected to a light sensor. Apple sells the unit with either a glossy or anti-glare finish to the LCD screen. Ours came with an anti-glare 1440x900 TFT screen with LED backlighting. From what we're told, LED backlights aren't used in notebooks so much for power savings (most OEMs say the reduction is minimal), but rather ecological reasons. Doing away with the fluorescent tubes in the screen eliminates the last bit of mercury in a notebook PC. Our screen was quite good in high-glare environments, such as our office and outdoors, but for watching movies or playing games, the glossy screen would be preferable.

As slim, fast, and fashionable as the MBP is, we do have issues with it. First, the screen

doesn't tilt back far enough. It's fine if you're sitting in front of it at a desk, but working from, say, the hood of a car or a lab bench, the off-axis angle is a minor annoyance.

Second, accessing the hard drive or optical drive is not fun, unless you're the kind of person who enjoys disassembling a notebook to do something that's quite easy with other notebook designs. There's also no way to add a cellular modem to the notebook and no factory option for it either.

Apple also decided to use an ExpressCard/34 slot instead of the standard ExpressCard/54, to save space. Hey, Apple, there's a reason there's a standard, and plenty of ExpressCard/54 parts are available, so why not just support both? We'd recommend chucking the FireWire 400 port to make room since there's no reason for both a FireWire 400 and FireWire 800 port.

In the grand scheme of things, these are fairly minor kvetches and the MacBook Pro is a surprisingly satisfying machine. —GU

SPECIFICATIONS

CPU	Intel Core 2 Duo T9300 (2.5GHz)
RAM	2GB DDR2/667
HARD DRIVE	250GB, 5,400rpm
SCREEN	15.4-inch TFT LED-backlit (1440x900)
LAP/CARRY WEIGHT	5 lbs. 6 oz./6 lbs.

MACBOOK PRO
\$2,500, www.apple.com

VERDICT

9

Dell XPS M1530

Stacked and packed, Dell's notebook is far better than the MBP—in some ways

We wondered if Dell was making a passive-aggressive statement when it shipped us its new XPS M1530 in flamingo pink. Perhaps the boys in Austin think the MacBook Pro is a bit effete, so the pink is fitting. Or perhaps someone on the reviews team just finished watching *Reservoir Dogs* and was channeling Steve Buscemi's Mr. Pink.

Whatever the reason, the XPS M1530—be it pink, blue, or brown—is a worthy contender to Apple's vaunted MacBook Pro. Featuring Intel's 2.5GHz Core 2 Duo T9300, 2GB of DDR2/667, a 250GB Samsung SpinPoint drive, and a GeForce 8600M GT, the XPS M1530 certainly has the specs to compete with the MBP in performance.

A notebook configured for media handling, the XPS sports an SD/Memory Stick reader, S-Video, VGA, and HDMI outputs. There are also two headphones jacks. Why? It's simple parent math: Two kids + two headphones + one Pixar movie = two hours of rest on the plane.

And there's no need to worry about the battery run time. Dell included a massive 9-cell battery with this XPS. It makes the notebook a bit bulkier but has the nice side effect of getting the bottom of the machine off the desk, which helps air circulate underneath it and keep the rig cooler. Dell's glossy LED-backlit screen makes watching movies a real treat.

Other amenities include a slot-fed DVD burner—a first for Dell, we believe—a biometric fingerprint reader, and built-in EVDO.

But as we've said, this isn't just about specs, it's also about usability. In that area, the Dell is a bit lacking. It features a set



The XPS's beautiful screen will catch your eye, but the specs will open your wallet.

of touch-sensitive buttons for volume and disc control, but then it falls back on an old-fashioned analog push button for power and the Dell Media Direct Application. We're also not big fans of the anodized aluminum combined with the black powder-coated magnesium bottom.

We do, however, like the Wi-Fi Catcher button. Push this button on the notebook's side and the XPS fires up an applet that searches for Wi-Fi access points. Unfortunately, once you decide you want to connect to an access point, functionality reverts to the stock Windows Vista applet

instead of something more custom and usable, like the applet Lenovo includes on its notebooks.

Dell has made a conscious effort to keep the vendor trialware and bloat to a minimum on the XPS, but there's still a crapload of icons on the desktop and Google Desktop is preloaded. As cool as the app is, Google Desktop is a major resource hog; we'd rather install it ourselves if we deem it necessary, thank you very much.

So take a beautiful screen, add Intel's second-fastest CPU, a pretty-fast GPU, and EVDO coverage, and you've got the MacBook Killer, right?

Maybe. See our final analysis on the following page. —GU

SPECIFICATIONS

CPU	Core 2 Duo T9300 (2.5GHz)
RAM	2GB DDR2/667
HARD DRIVE	250GB, 5,400rpm
SCREEN	15.4-inch LED-backlit TFT (1440x900)
LAP/CARRY WEIGHT	6 lbs. 3 oz./7 lbs. 5 oz.

DELL XPS M1530
\$2,000, www.dell.com

VERDICT

8

Best in Class: Professional

Don't rub your eyes, the MacBook is the winner

In many ways, Dell's XPS M1530 is the better notebook of the two. Its screen is better by a country mile in photo rendering, it's faster in gaming, it has built-in EVDO—something you can't even get from Apple—and it costs \$500 less for comparable hardware.

So why are we declaring the MacBook Pro the winner? We had a few issues with our XPS unit, such as unexplainably low scores in our Premiere Pro CS3 test that gave us the shivers: It took more than twice as long as our MacBook Pro to render video and was quite a bit slower in our Photoshop CS3 test.

We have no idea why. The XPS was just about as fast as the MBP in our MainConcept encoding test and faster at slide-show creation, which would typically translate to comparable scores in our two Adobe-based benchmarks.

As for the XPS's beefy 9-cell battery, the machine pooped out after 2:45 (hrs:min) of DVD playback. The MacBook Pro, running the OS X-based DVD app, had us up past midnight waiting for the damned thing to die at 3:15—and that's using an internal battery that doesn't pork up the formfactor. Whether the weak rundown time was caused by the unoptimized Windows Media Center DVD player or some CPU-sapping third-party app that Dell installed on the XPS, we weren't happy with the results.

The XPS is redeemed in port selection, with three USB ports, as well as S-Video, HDMI, and VGA, compared to the MacBook Pro's single DVI and two USB ports. And the XPS clearly has the better screen. Although favored by professional photographers, the MBP's screen is subpar and displays horrible banding in OS X. The

XPS also bests the MBP with EVDO. And remember, the XPS is \$500 less—and that's without taking into account the cost of a Windows license if to run your games or other applications on the MBP.

That's what makes our pick stick in our craw so much. The XPS is better in many respects, but it has the same weaknesses as most OEM PCs. From the get-go, even though Dell's load out is better than most others here, it's still bogged down by third-party bloatware. And Vista drivers might be better today than they were, but something, somewhere in the XPS is dragging down battery life and performance.

That puts the admittedly overpriced MacBook Pro in the pole position. While that's likely to piss off many PC diehards, perhaps it's time those folks finally admit the MacBook Pro to the power-PC family. —GU

BENCHMARKS

	Apple MacBook Pro	Dell XPS M1530
Premiere Pro CS3 (min:sec)	30:12	65:00
Photoshop CS3 (min:sec)	3:44	4:08
ProShow (min:sec)	34:21	32:28
MainConcept (min:sec)	56:17	57:09
FEAR (fps)	45	49
Quake 4 (fps)	83.5	103.3
Battery Rundown (hrs:min)	3:15	2:45

Best scores are bolded.

OS X: The Good, the Bad & the Ugly

The biggest difference between an Apple notebook and its PC counterparts is the operating system. Sure, Apple's adoption of the x86 architecture makes it quite possible to run Windows on an Apple machine, but here's a crash course in the unique features Apple's home-grown OS offers and the pitfalls of running Windows on a Mac.

OS X IS A LOT LIKE WINDOWS

Switching OSes is always tough, but Apple does a good job of making Windows users feel right at home. Many Windows-specific keyboard shortcuts function similarly in OS X and basic file browsing is the same.

OS X IS COMPLETELY DIFFERENT FROM WINDOWS

In other ways, OS X is a very different beast. For example, instead of storing all the bits and pieces of your installed apps in a folder on your hard drive, everything the app needs to run is stored in a container file. To start the app, you double-click the container. It's deceptively simple, and we like it.

WINDOWS ON A MAC IS A LITTLE WEIRD

Installing Windows on a MacBook is easier than installing it on many enthusiast PCs. You start the installer from inside OS X; when the Windows install completes, you run a single app that installs all necessary drivers. Unfortunately, some commonly used notebook functions, such as tap to click on the touchpad, don't work.

OS X IS REALLY, REALLY SLICK

Using an operating system that's designed for power users and newbies alike is truly glorious.

YOU'LL NEED TO REBUY ALL YOUR APPLICATIONS

Replacing apps could cost you nothing—or thousands

YOU'LL NEED COOLER PANTS

When people see you toting a MacBook around, they'll expect that you're a little more Justin Long than John Hodgman, and your circa 1987 Lee's don't send that message, chief.



PERFORMANCE ON OS X IS PRETTY DARN GOOD...

We last compared OS X and Windows performance right after Apple switched to Intel x86, and the results for OS X were ugly, thanks possibly to the emulation layer that most Mac software used. Now two and a half years later, we can say things are looking far better for OS X. Photoshop, which was a total joke in 2006 on the Intel Macs, is definitely improved. Though still slower than on Windows Vista, at least you won't be firing cruise missiles at John Warnock and Steve Jobs.

In other applications, OS X performance is quite peppy. We used Bibble Pro to convert 233 Canon EOS 5D RAW files to JPEG. OS X outsprinted Vista. Using HandBrake to convert an episode of *The Rockford Files* also saw OS X in front. Not every application

BENCHMARKS

	OS X Leopard	Windows Vista Home Premium
Photoshop CS3 (min:sec)	3:56	3:44
Bibble Pro (min:sec)	14:18	24:46
HandBrake VOB to iPod (min:sec)	4:26	5:41

Best scores are bolded. All tests were run on the MacBook Pro.

has been optimized for the "Mactel" machines, but it looks like the worst storm clouds are over for Apple in performance. ☎

FIREFOX 3: A BROWSER ODYSSEY

Mozilla's new open-source browser adds power-user features to transform life on the Internet

BY NATHAN EDWARDS

Let us lay out a hypothetical situation for you: You've been driving that lumbering old Crown Vic since Ken Starr was culturally relevant. It's clunky, not particularly fast, and prone to breakdowns, and it lacks any sort of sex appeal. But you're used to it, and it's not like you're made of money, right? Suddenly your benevolent (and extremely wealthy) uncle calls you up and offers you a Tesla roadster. It's fast, sleek, and technologically advanced, runs without gasoline, and is sexy as all get-out. And he's giving it to you for free. Do you take it?

Hell yeah, you take it. And if Uncle Mozilla offers you a fast, light, open-source, wildly configurable, sexy web browser, you take that too. Internet Explorer's a clunker, and if you've somehow managed to go the past four years without switching to the roadster that is Firefox, it's high time to take a test drive. If you're already a Firefox user, well, here comes your supercharger.

Firefox 3, the latest version of Mozilla's champion web browser, is on the horizon, and it promises to make the best browser in the world even better. Firefox 3 brings to the table smart bookmarks, more efficient memory usage, a vastly improved location bar, tighter security, and more. Join us as we dig deep into Firefox 3 Beta 5 for a look at the future of web browsing; we'll show you the features power users should care about and give you tips for getting all that you can from your new favorite browser.



Feature by Feature

Firefox 3 is packed with improvements, but here's what we're most excited about!



SECURITY

By now we're all familiar with the padlock that appears in the location bar to indicate that a site is safe. The trouble is that the symbol doesn't provide much useful information, such as degree of security, and it can easily be faked—any nefarious site can use a padlock as its favicon (the identifying icon that appears next to a site's URL in the location bar and tabs) to fool careless users. In Firefox 3, the padlock has moved to the status bar, and a site's security is now represented by color-coding—the area surrounding a site's favicon in the location bar is colored gray, blue, or green for an at-a-glance security brief. Gray represents no security credentials and green represents the maximum. Clicking a site's favicon brings up a dialog box containing a similarly colored Passport Officer and all known details about a site's security: who owns the security certificate, the certifying body, etc. A More Information button reveals encryption level, times visited, what cookies the site has set, and more. In our tests, though, very few sites displayed full credentials—our Internet banking site, for example, didn't rate a green stamp, even though it's certified by VeriSign. Instead, we got the slightly less reassuring blue.

Firefox 3 also features a community-contributed database of malware and phishing sites, similar to IE7's. Click a link to a site in the database and you land on a Firefox interstitial page warning you that the site you're trying to visit has been deemed questionable. Community-based security is only as good as the community, of course, but it's a nice addition. We don't typically run into malware or phishing

sites, but anyone who keeps a neophyte's PC running is sure to appreciate this extra line of defense.

INTERFACE IMPROVEMENTS

Firefox 3 packs a lot of interface and usability tweaks, both subtle and obvious. On the subtle end of the spectrum, you'll notice tighter graphical integration with the OS. Firefox's updated UI uses OS-specific text boxes and UI cues to emulate native applications. Nothing earth-shattering here for Windows users—indeed, the new keyhole-shaped back/forward buttons are the only difference we noticed. But Linux and OS X fans have reason to cheer—the browser is especially good looking on a Mac.

Session Saving, which allows you to preserve the sites you have open in your tabs and windows when you close Firefox, lets you save your browser's state every time you close Firefox, not just when the browser crashes. When you close Firefox 3, you'll be asked whether you want to save and quit or just quit. If you choose the former, you'll return to the same tabs next time you open Firefox.

The Download Manager also gets a tune-up: Downloads can now be paused, resumed, and saved between sessions, and you can even copy a download link to the clipboard—useful if you want to send a link to a pal or redownload a file later.

We also like the less-obtrusive Password Manager. Now, instead of opening a dialog box when you input a new username/password combo, the Password Manager opens in toolbar form at the top of the page.

EXPRESS YOURSELF

What's Your Firefox Persona?

Want to add a little flavor to your Firefox toolbars without messing around with themes? Try Personas (<http://tinyurl.com/4dwpc2>). This easy-to-use Add-On from Mozilla Labs lets you add custom graphics to your Firefox header and footer—just click the little fox-head logo in the lower left-hand corner and pick one of the available themes. If none of them catches your eye, make your own! Create a 3000x200 image for the header and a 3000x100 one for the footer, then point to them using the Preferences menu!



FIREFOX 3: A BROWSER ODYSSEY

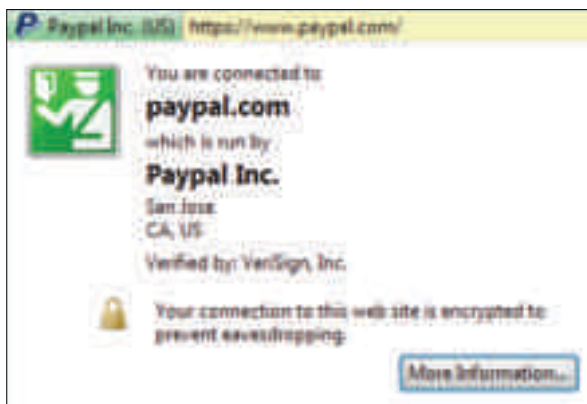
BOOKMARKS

While it isn't apparent at first glance, the bookmark menu gets a total overhaul in Firefox 3. It's designed for people who don't count creating precisely cataloged browser bookmarks as one of their life goals. In short, bookmarks are now taggable entries in a database instead of untagged entries in a flat text file. Tag your morning trawl through the blogosphere with "mornings" and find them all at once. Tag your comics with "comics." Tag MaximumPC.com with "awesome." Bookmarking is easier, too—just click the star in the location bar to add a page to your bookmarks, then click it again if you want to edit the description, add tags, or sort it into a folder.

Firefox 3 also introduces Smart Bookmarks, which use the new Places library to group bookmarks automatically, similar to iTunes's Smart Playlists. Default Smart Bookmarks include your top 10 most visited sites, recently bookmarked sites, and recent tags, but you can customize them to your particular tastes. Your top sites reset every time you clear your browsing history, which can be good or bad—nobody, least of all you yourself, should know the extent of your Perez Hilton addiction.

AWESOMEBAR

The new location bar is dubbed the AwesomeBar by users and developers alike. After mucking around with it for a while, we can confirm that it is, indeed, awesome. Your location bar is now a high-powered search bar—just start typing to see it in action! In Firefox 2, the location bar drop-down shows only page URLs and titles. In Firefox 3, results include favicons, tags, and bookmarks (as well as full URLs and titles).



The green Passport Officer indicates that a site is credited with maximum security.

Search results are sorted by "frecency"—a hybrid of "frequency" and "recency"—based on how recently you've visited the sites, how often you've visited, whether the sites are bookmarked and tagged, etc. You can even use multi-word searches: Typing "vigilante penny comic," for example, brought up a specific Penny Arcade comic we visited yesterday—based on the page title, the URL, and our bookmark tag for the site. For more on the "frecency" algorithm and how you can make it work for you, check out our power-user tips on the next pages.

RECOVERED MEMORY

Mozilla Puts an End to Memory Leaks

Previous versions of Firefox have drawn criticism for inefficient memory use—the longer Firefox was open, the more memory it used, reaching into the hundreds of megabytes. This was due to a number of factors: the increasingly large memory demands of JavaScript-rich pages like Google Apps and other AJAX sites; the automatic caching of forward- and back-navigated pages, images, and fonts; memory fragmentation; and straight-up memory leaks (caused when Firefox or its extensions would fail to release memory that was no longer being used).

With Firefox 3, Mozilla introduces a memory cycle collector that monitors and cleans up memory that's tied up in self-referential processes, or cycles. Cached forward- and back-navigated pages now expire after 30 minutes, so if you're the kind of person who visits lots of sites in the same tab, you'll no longer be keeping dozens of pages stored in memory. Compressed images are no longer stored uncom-

pressed in memory for pages you're not actively viewing, and animated GIFs are stored in a much more efficient format. Hundreds of memory leaks have also been plugged.

In our hands-on testing, we found that AJAX-dominated pages loaded much faster, and Firefox 3 Beta 5 drew about half the memory after prolonged use than Firefox 2 did in similar circumstances. We ran the same 15 tabs (with multiple pages in the history of each tab), including Gmail and Outlook webmail, for two hours in both browsers, and found that while Firefox 2 was using about 240MB of RAM, Firefox 3 had cut that down to 163MB. We still noticed some slowdown and heavy CPU usage when coming back to a long-inactive session that included multiple instances of Gmail and other complex pages, though.

For the most part, Firefox 3 Beta 5 is zippier and less leaky than prior iterations, and we expect to see even more improvements in the final version.

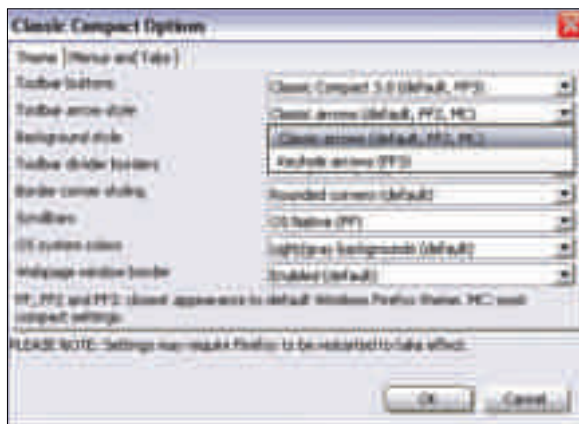
Breaking in the New Browser

You're not a power user if you're using Firefox 3 as-is. Here are some tweaks to get you started

MAKE IT MINI

Don't like the new "keyhole" arrows? Want to make Firefox even less obtrusive? Install the Classic Compact theme (<http://tinyurl.com/2eon5x>) and its companion, the Classic Compact Options Add-on (<http://tinyurl.com/49wz9g>). As the name suggests, Classic Compact trims the size of menus, buttons, and tabs, so you can concentrate on the pages you're looking at—useful for smaller monitors like those on today's ultraportable notebooks.

The Options Add-on lets you customize the Classic Compact theme, so you can create your own mix-and-match theme that's as compact as you want it to be. Keep the keyhole, but shrink the tabs? Sure! You can even compress your menu bar into just one drop-down button.



Maximize your screen real estate with the Classic Compact theme/Add-on combo.



MAKE THE AWESOMEBAR MORE AWESOME

First, the scoop on the AwesomeBar algorithm: The "frecency" algorithm weighs results based on a combination of *frequency* and *recency*, as mentioned before. But how exactly are they weighted? In short: Typed URLs are valued the highest, followed by bookmarks, then links you've manually clicked. After this, results are weighted by the "frecency" of your site visits. A site you've visited 10 times this week is weighted higher than a site you visited 10 times last week, for example. So the more often and the more recently you've been there, the higher "frecency" it has and the higher it's rated.

We think the Awesome Bar rocks as-is. But if you want to tweak it more to your liking, we've got you covered.

- Change the maximum number of results the AwesomeBar returns: Go to the almighty `about:config` page. Use the box at the top to navigate to `browser.url.maxRichResults`. The default is 12; we prefer 6, so we don't have to scroll within the drop-down menu.
- Only return results for URLs you've actually typed: Go to `about:config` again and search for `browser.urlbar.matchOnlyTyped`. Set it to "true" to limit results to those you've actually typed—find the pages you want without sifting through cruft.

If you just don't like the AwesomeBar, we have good news and bad news. The bad news is that Mozilla scrapped the old location bar code. The good news is that there's an Add-on (of course) called Oldbar that emulates FF2's location bar. Find it at <http://tinyurl.com/2ba79x>.

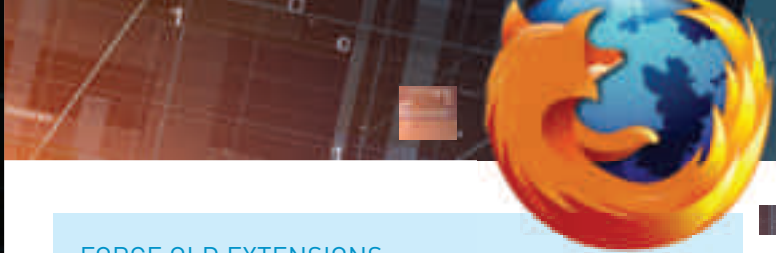


BOOKMARK SMARTER

Get creative with your tags. If you're a baseball junkie, mark all your go-to sites (for us, that's Deadspin, Viva el Birdos, Buster Olney, and Baseball Musings) with the same tag—say, something clever like "baseball." Then open your Bookmark Library (`Ctrl+Shift+B` in Windows). Find "baseball" in your Tags folder, and drag it to your bookmarks toolbar. You've just created a Smart Bookmark. Now click "Open all in tabs" and enjoy your sports fix!

Early beta builds of Firefox 3 shipped with six default Smart Bookmarks, but they've been whittled down to three in Beta 5. To restore the old Smart Bookmarks, go to `about:config` and search for `browser.places.smartBookmarksVersion`. Set it to 0 and restart Firefox. Presto! More Smart Bookmarks.

It's possible to make even more nuanced Smart Bookmarks that take into account specific parameters of your choosing, such as sites visited that include the word "linux," but you've got your work cut out for you. As of Beta 5, you'll have to resort to manually creating more complicated bookmarks. You'll need to go to Add Bookmarks, create a name, and then create a query string in the location bar (for example, the string for the "Most Visited" Smart Bookmark is `place:queryType=0&sort=8&maxResults=10`). Hopefully, Mozilla or a third-party developer will have created an easy Smart Bookmarks extension by the time Firefox 3 is officially released, but until then you'll have to rely on sites like MozillaZine (<http://tinyurl.com/6dluoq>) for help.



FORCE OLD EXTENSIONS

Tired of waiting for someone to update your favorite extension for Firefox 3? Good news: Many older extensions work fine in Firefox 3. You just have to disable the compatibility check. Point your browser to `about:config`, then create a new entry. Call it `extensions.checkCompatibility` and set its value to “false.” Then restart Firefox. Presto! Your old extensions are back! Proceed with caution, though—some extensions (mainly bookmark extensions like Foxmarks, extensions related to the Firefox 2 location bar, and tab-related extensions like ChromaTabs) genuinely *aren't* compatible due to changes in Firefox 3, so if you find Firefox is acting wonky, change this value back to “true” and hope your favorite extension developer gets up to speed.

THREE MUST-HAVE EXTENSIONS

Add-ons, also known as Extensions, are what set Firefox apart from the crowd—be it the stuffy inflexibility of IE or the all-inclusive weight of Opera. You may not need built-in RSS, BitTorrent, or mail clients, or you might merely want the opportunity to pick the best available extras to construct your ideal browser a la carte. There are thousands of Add-ons for Firefox to suit every personality and preference. But there are three we think everyone can benefit from.

- **FireGestures** (<http://tinyurl.com/38qlcl>): Once you've used mouse gestures to navigate, you'll wonder what you ever did without them. There are many mouse gesture extensions out there, but we like this one the best, and it's already Firefox 3 compatible.
- **Shareaholic** (<http://tinyurl.com/33q9lo>): Share links on Digg, Reddit, del.icio.us, Facebook, and many other sites from a single drop-down button.
- **Foxmarks** (<http://tinyurl.com/s2ed9>): Automatically sync your bookmarks between multiple computers. A beta version supports Firefox 3, as well as profiles—keep your work bookmarks and home bookmarks separate, but access them from anywhere. ☹



Shareaholic makes sharing links with your friends and social networks easy.



In Firefox 3, the whole page resizes, not just text—buh-bye, layout snafus.

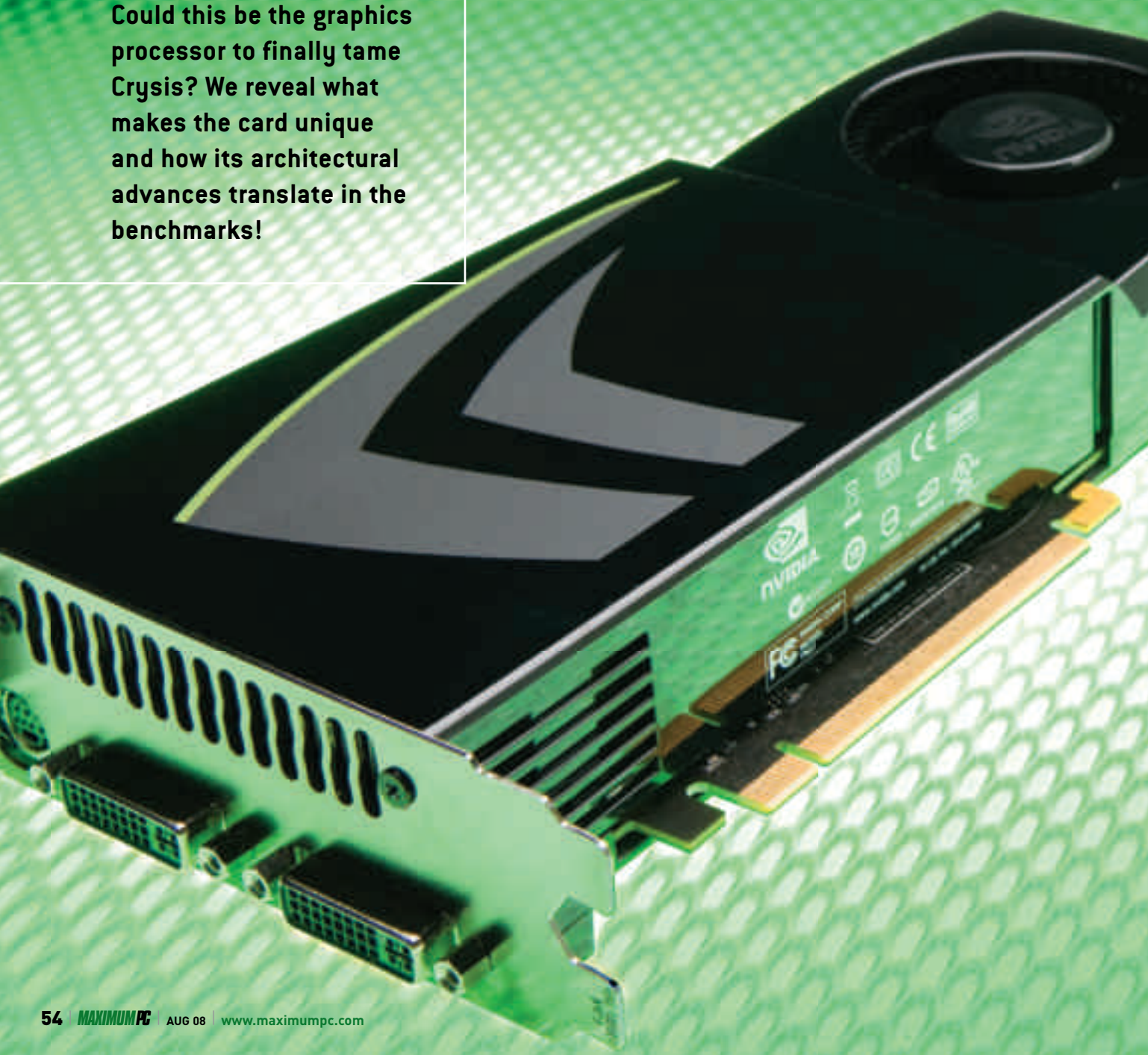
ZOOM IN, ZOOM OUT

Firefox 3 finally introduces full-page zoom. Previous versions of Firefox resized only text, breaking layouts, tables, and hearts. No longer. Press `Ctrl-` to zoom out, `Ctrl+` to zoom in, or just hold `Ctrl` and zoom in and out with your mouse wheel. Firefox 3 even remembers your zoom preferences for each website—set it once and forget about it! Or if you're old fashioned, disable full-page zoom by going to `View > Zoom > Zoom Text Only`.

UNVEILED: NVIDIA'S

**WE LAY HANDS ON
THE SMOKIN'-FAST
GEFORCE GTX 280.**

Could this be the graphics processor to finally tame Crysis? We reveal what makes the card unique and how its architectural advances translate in the benchmarks!



NEXT-GEN GPU

The Details Disclosed

The whole truth and nothing but the truth (as far as we know it)

BY MICHAEL BROWN

Watching the ongoing race between AMD and Nvidia to build the ultimate graphics processor reminds us of the tale of the tortoise and the hare. AMD has played the hare, aggressively bounding ahead of Nvidia in terms of process size, number of stream processors, frame buffer size, memory interface, die size, and even memory type. Yet Nvidia always manages to snag the performance crown. The GeForce 200 series is but the latest example.

We convinced Nvidia to provide us with an early engineering sample of its high-end reference design (the GeForce GTX 280), with very immature drivers, for a first look at the GPU's performance potential. At the time of this writing, the company is still a full month away from shipping this product, and its lesser cousin, the GeForce GTX 260, so we won't issue a formal verdict in this issue (our full hands-on review should be online by the time this issue reaches you).

As interesting as the benchmark numbers are, the story behind this new architecture is even more fascinating. We'll give you all the juicy details, but first, let's explain the new naming scheme: Nvidia has sowed a lot of brand confusion in the recent past, especially with the 512MB 8800 GTS. That card was based on a completely different GPU architecture than the 8800 GTS models with 320MB and 640MB frame buffers. The Green Team hopes to change that with this generation.

The letters GTX now represent

Nvidia's "performance" brand, and the three digits following those letters will indicate the degree of performance scaling: The higher the number, the more performance you should expect. Using 260 as a starting line should give the company plenty of headroom for future products (as well as leave a few slots open below for budget parts).

MANUFACTURING PROCESS

AMD jumped ahead to a 55nm manufacturing process with the RV670 (the foundation for the company's flagship Radeon HD 3870), but Nvidia stuck with the tried-and-true 65nm process for the GeForce 200 series. Nvidia cites the new part's long development cycle and sensible risk management as justification.

The GTX 280 is an absolute beast of a GPU: Packing 1.4 billion transistors (the 8800 GTX got by with a mere 681 million, and a quad-core Penryn has 820 million), it's capable of bringing a staggering 930 gigaFLOPs of processing power to any given application (a Radeon HD 3870 delivers 496 gigaFLOPs, while the quad-core Penryn musters just 96).

Considering the transistor count and the 65nm process size, the GeForce 200 die must be absolutely huge (and Nvidia's manufacturing yields hideously low). Although Nvidia declined to provide numbers on either of those fronts, those two questions will remain academic in the absence of fresh and considerable competition from AMD.

(And for the record, all AMD would tell us about its new part is that we can expect it "real soon.")

PROCESSOR CORES

The GeForce GTX 280 has 240 stream processors onboard (Nvidia has taken to calling them "processing cores"). This being Nvidia's second-generation unified architecture, each core can handle vertex-shader, pixel-shader, or geometry-shader instructions as needed. The cores can handle other types of highly parallel, data-intensive computations, too—including physics, a topic we'll explore in more depth shortly. The GeForce GTX 260 is equipped with 192 stream processors.

Although the GeForce 280 has nearly twice as many stream processors as Nvidia's previous best GPU, it's still 80 shy of the 320 in AMD's Radeon HD 3870. But Nvidia's asymmetric clock trick, which enables its stream processors to run at clock speeds more than double that of the core, has so far obliterated AMD's numerical advantage. In fact, a single GeForce GTX 280 proved to be an average of 28 percent faster than the dual-GPU Radeon HD 3870 X2 with real-world games running on Windows XP, and it was 24 percent faster running Vista.

We didn't have an opportunity to benchmark the GTX 280 in SLI mode (or the GTX 260 at all), but a single GTX 280 beat two GeForce 9800 GTX cards running in SLI by a 9-percent margin, thanks in large measure to significantly improved performance with Crysis. (Turn to page 60 for complete benchmark results.)

A significant increase in the number of raster-operation processors (ROPs) and the speed at which they operate likely contributes to the new chip's impressive performance. The 8800 GTX has 24 ROPs and the 9800 GTX has 16, but if the resulting pixels need to be blended as they're written to the frame buffer, those two GPUs require two clock cycles to complete the operation. The 9800 GTX, therefore, is capable of blending only eight pixels per clock cycle.

The GTX 280 not only has 32 ROPs but is also capable of blending pixels at full speed—so its 32 ROPs can blend 32 pixels per clock cycle. The GTX 260, which is also capable of full-speed blending, is outfitted with 28 ROPs.

MEMORY AND CLOCK SPEEDS

GeForce GTX 280 cards will feature a 1GB frame buffer, and the GPU will access that memory over an interface that's a full 512

bits wide. AMD's Radeon 2900 XT, you might recall, also had a 512-bit memory interface, but the company dialed back to a 256-bit interface for the Radeon 3800-series, claiming that the wider alternative didn't offer much of a performance advantage. That was before Crysis hit the market.

Cards based on the GTX 260 will have 896MB of memory with a 448-bit interface. Despite the news that AMD will move to GDDR5 with its next-generation GPUs, Nvidia is sticking with GDDR3, claiming that the technology "still has plenty of life in it." Judging by the performance of the GTX 280 compared to the Radeon 3870 X2, which uses GDDR4 memory (albeit half as much and with an interface half as wide as the GTX 280's), we'd have to agree. Nvidia is taking a similar ap-

proach to Direct3D 10.1 and Shader Model 4.1: The GTX 280 and GTX 260 don't support either.

A stock GTX 280 will run its core at 602MHz while its stream processors hum along at 1.296GHz. Memory will be clocked at 1.107GHz. The GTX 260 will have stock core, stream processor, and memory clock speeds of 576MHz, 1.242GHz, and 999MHz, respectively (what, they couldn't squeeze out an extra MHz to reach an even gig?).

THE PHYSX CONNECTION

When Nvidia acquired the struggling Ageia, we were disappointed—but not surprised—to learn that Nvidia was interested only in the PhysX software. While it wouldn't be accurate to say that Nvidia has orphaned the hardware, the company has no plans to continue developing the PhysX silicon. What's more,

DIE SHOT

You're Staring at 1.4 Billion Transistors

You could fit nearly six Penryns onto a single GeForce GTX 280 die, although a portion of the latter part's massive size can be attributed to the fact that it's manufactured using a 65nm process, compared to the Penryn's more advanced 45nm process.

Nvidia packs 240 tiny processing cores into this space, plus 32 raster-operation processors, a host of memory controllers, and a set of texture processors. Thread schedulers, the host interface, and other components reside in the center of the die. With technologies like CUDA, Nvidia is increasingly targeting general-purpose computing as a primary application for its hardware, reducing its reliance on PC gaming as the *raison d'être* for such high-end GPUs.



there is absolutely no Ageia intellectual property to be found in the GTX 200-series silicon—the new GPU had already been taped out when the acquisition was finalized in February.

But Nvidia didn't acquire Ageia just to put the company out of its misery. The company's engineers quickly set about porting the PhysX software to Nvidia's GeForce 8-, 9-, and 200-series GPUs. When Ageia first introduced the PhysX silicon, the company maintained that it was a superior solution to the CPU and GPU architectures, which weren't specifically optimized for accelerating complex physics calculations. In reality, the PhysX architecture wasn't as radically different from modern GPU architectures as we'd been told.

The first PhysX part, for example, had 30 parallel cores; the mobile version that ships in Dell's XPS 1730 notebook PC has 40 cores. Nvidia tells us it took only three months to get PhysX software running on GeForce, and the software will soon be running on every CUDA platform. See the sidebar on this page for more information on the GeForce 200-series's physics capabilities.

SLI AND DISPLAY CONSIDERATIONS

Both the GeForce GTX 280 and 260 have two SLI edge connectors, so they will support three-way SLI configurations. Nvidia wouldn't comment on

who want support for displays with 10-bit color and 120Hz refresh rates.

MORE ARCHITECTURAL DETAILS

Nvidia tells us there's more to the GeForce 200 series than just substantial increases in the numbers of stream processors and ROPs. The new GPUs, for example, are capable of managing three times as many threads in flight at a given time as the previous architecture. Improved dual-issue performance enables each stream processor to execute multiple instructions simultaneously, and the new processors have twice as many registers as the previous generation.

These performance-oriented improvements should allow for faster shader performance and increasingly complex shader effects, according to Nvidia. In a new demo called Medusa, a geometry shader enables the mythical creature to turn a warrior to stone with a single touch. This isn't a simple texture change or skinning operation—the stone slowly creeps up the warrior's leg, torso, and face until he is completely transformed. Medusa then knocks off his head with a flick of her tail for good measure.

Nvidia still perceives gaming as a critically important market for its GPUs, but the company is also looking well beyond that large, but still niche, market. Through its CUDA (Compute Unified Device Architecture) initiative,

WE WERE DISAPPOINTED—BUT NOT SURPRISED—TO LEARN THAT NVIDIA WAS INTERESTED ONLY IN THE PHYSX SOFTWARE.

the possibility of a future single-board, dual-GPU product that would allow quad SLI, but reps did tell us they expect the current dual-GPU GeForce 9800 GX2 to fade away.

Nvidia's reference-design board features two DVI ports and one analog video output on the mounting bracket, with HDMI support available via dongle. The somewhat kludgy solution of bringing digital audio to the board via SPDIF cable remains (we much prefer AMD's over-the-bus solution). Add-in board partners can choose to offer DisplayPort SKUs for customers

the company is taking on an increasing number of apps that have traditionally been the responsibility of the host CPU. Nvidia isn't looking to replace the CPU with a GPU, it's just trying to convince consumers that GPU purchasing decisions and upgrades are more important than CPU purchasing decisions.

CUDA applications will run on any GeForce 8- or 9-series GPU, but the GeForce 200 series delivers an important advantage over those architectures: support for the IEEE-754R double-precision floating-point standard. This should make the new GPUs—

Physics on the GPU

The screenshot below shows something of what's possible with PhysX technology. The Unreal Tournament Tornado mod features a whirling vortex that tears the battlefield apart as the game progresses. The tornado can also suck in projectile weapons, such as rockets, adding an exciting new dynamic to the game.

Unfortunately for Ageia, mods such as this were too few and far between, and this chicken-or-the-egg conundrum ultimately killed the PhysX physics processing unit. By the time Nvidia acquired the company, Ageia had convinced just two manufacturers—Asus and BFG—to build add-in boards based on the PPU, and Dell was the only major notebook manufacturer to offer machines featuring the mobile version. Absent a large installed base of customers, few major game developers (aside from Epic and Ubisoft's GRAW team) saw any reason to support the hardware.

Nvidia will have a much more persuasive argument: When it releases PhysX drivers for the GeForce 8-, 9-, and 200-series GPUs, the installed base will amount to 90 million units—a number expected to swell to 100 million by the end of 2008.

Even then, we predict PhysX will need a killer app if it's to really take off. Nvidia will need to help foster the development of more PhysX-exclusive games, such as the Tornado and Lighthouse mods for Unreal Tournament 3, and the Ageia Island level in Ghost Recon: Advanced Warfighter.

Nvidia will also remedy one of Ageia's key marketing mistakes: Consumers couldn't run a PhysX application unless they had a PhysX processor, which meant they had no idea what they might be missing out on. Under Nvidia's wing, PhysX applications will fall back to the host CPU in the absence of a CUDA-compatible processor. The app might run like a fly dipped in molasses, but the experience could fuel demand for Nvidia-based videocards.

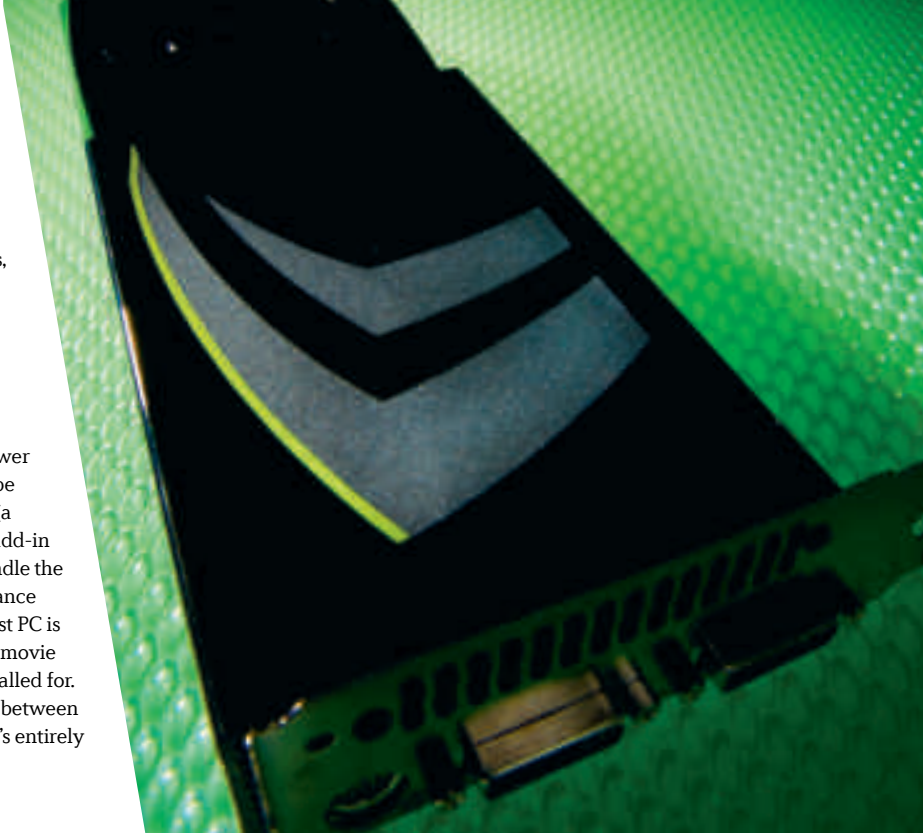
Nvidia tells us it expects to have PhysX drivers for the GTX-200 series shortly after launch; drivers for GeForce 8- and 9-series parts will follow shortly thereafter.



and CUDA in general—even more attractive to users who develop or run applications that rely heavily on floating-point math. Such applications are common not only in the scientific, engineering, and financial markets, but also in the mainstream consumer marketplace (for everything from video transcoding to digital photo and video editing).

POWER CONSIDERATIONS

Nvidia has made great strides in reducing its GPUs' power consumption, and the GeForce 200 series promises to be no exception. In addition to supporting Hybrid Power (a feature that can shut down a relatively power-thirsty add-in GPU when a more economical integrated GPU can handle the workload instead), these new chips will have performance modes optimized for times when Vista is idle or the host PC is running a 2D application, when the user is watching a movie on Blu-ray or DVD, and when full 3D performance is called for. Nvidia promises the GeForce device driver will switch between these modes based on GPU utilization in a fashion that's entirely transparent to the user.



The GeForce GTX 280 in Action

We can't take the performance of an engineering-sample board with early drivers as gospel, but the benchmark results have us hungry for shipping product

Few things piss us off as readily as new architecture that offers only incremental improvements in performance. Fortunately for Nvidia, that's not the case with the GeForce GTX 280. Assuming the drivers that ship with this card deliver performance as good as these beta versions, Nvidia will have another in what has been a long list of winners on its hands.

The GTX 280 delivered real-world

benchmark numbers nearly 50 percent faster than a single GeForce 9800 GTX running on Windows XP, and it was 23-percent faster than that card running on Vista. In fact, it looks as though a single GTX 280 will be comparable to—and in some cases beat—two 9800 GTX cards running in SLI, a fact that explains why Nvidia expects the 9800 GX2 to fade from the scene rather quickly.

We're especially pleased with the performance delta we observed with Crysis: Even with the resolution at 1920x1200, 4x antialiasing enabled, and all the game's other quality settings on high, our engineering sample delivered the game at more than 30 frames per second running DirectX 9. Games still run slower on Vista, however; Crysis, for example, shed about eight frames per second running DirectX 10, but it was still twice as fast as a single 9800 GTX. And remember, we tested an engineering sample running on pre-release drivers.

The GTX 280 absolutely clobbered AMD's dual-GPU Radeon 3870 X2, delivering superior overall benchmarks in both Windows XP and Vista. The one bright spot, oddly enough, was the X2's Crysis performance in Vista: AMD's part managed to run the game two frames per second faster than Nvidia's latest. The single GTX 280, on the other hand, was more than twice as fast running the RTS World in Conflict under Vista. ☺

BENCHMARKS

	Prototype GTX 280	PNY 9800 GTX	PNY 9800 GTX SLI	MSI Radeon 3870 X2
3DMark06: Game 1 (fps)	43.9	31.3	57.6	46.6
3DMark06: Game 2 (fps)	38.8	24.8	45.9	42.0
3DMark Vantage: Game 1 (fps)	17.5	8.0	15.3	9.5
3DMark Vantage: Game 2 (fps)	14.5	7.7	14.8	9.5
Crysis (fps)	22.6	11.7	12.8	24.8
Unreal Tournament 3 (fps)	76.5	75.4	81.4	63.6
Company of Heroes: Opposing Fronts (fps)	47.8	37.5	40.1	41.7
World in Conflict (fps)	31.0	19.8	29.0	13.0

Best scores are bolded. Nvidia-based cards tested with an EVGA 680i SLI motherboard; AMD-based cards tested with an Intel D975BX2 motherboard. Intel 2.93GHz Core 2 Extreme CPUs and 2GB of Corsair DDR RAM used in both scenarios. Benchmarks performed at 1920x1200 resolution on ViewSonic VP2330wb monitors.

WHITE PAPER

Raster vs. Rays

How 3D game rendering is changing with hardware advancements —ZACK STERN

The shiny, new hatchback you nudge in a street race dents slightly on the driver's side door. Although you're playing a PC game, created with beaucoup equations, the bend looks almost real. The 3D renderer sculpts all those numbers into images, with help from the video API (application program interface). However, several completely different rendering techniques can be the source of those images. Currently, the hardware and software industries are debating how to best utilize two graphics-rendering techniques: ray tracing and rasterization.

Rasterizing is widely used to render current 3D games because it strikes a compromise between real-time processing demands and pretty pictures. Its regular, predictable patterns are also suited to specialized massively parallel processors, such as GPUs. Essentially, the raster engine looks at the thousands of 2D triangles that build a 3D scene and determines which are visible in the current perspective. With that

information, the engine analyzes the light sources and other environment details to light and color pixels onto each triangle.

Ray tracing takes the opposite approach, borrowing from the way photons move in the real world. In nature, a light source creates countless photons (or rays) that bounce off objects, take on their color and properties, and eventually reach your eye. Ray tracing reverses the process, firing its gaze away from the camera perspective, assessing which objects are in view. When a ray hits something, the engine knows to draw a pixel.

THE GRAY AREA

These two techniques further diverge when adding shadows and other details to a scene. Rasterized graphics can use a few techniques to create light and dark, frequently relying on shadow maps. These guides are created by rasterizing from the perspective of a light

source, seeing which objects are visible, and shading the camera perspective based on this blueprint. A ray tracer calculates shadows just by tracing more beams and seeing how they bounce. If a beam's path leads back to a light source, its pixel is drawn brighter.

"IF YOU COULD DO ALL RAY TRACING, WOULD YOU? I DON'T THINK YOU WOULD."

If the beam ends without hitting a light, the engine knows to draw that pixel in shadow.

Ray tracing's realism—and system burden—comes from the arbitrary point at which the engine stops calculating these bounces. Every time the beam ricochets off another object, more color, shadow, and reflection details can be added back to the first collision pixel. Fog effects can be especially taxing, requiring the beams to refract through a mist. The best-looking images can take billions of rays; that's just too much number crunching for today's CPUs and GPUs to handle in real time.

And even if those chips could keep up, other bottlenecks couldn't keep pace with a fully ray-traced real-time scene. "It's just too hard in terms of memory bandwidth; it's too hard in terms of silicon speed," says David Kirk, chief scientist at Nvidia. "It's just too hard. And I don't think that's the goal."

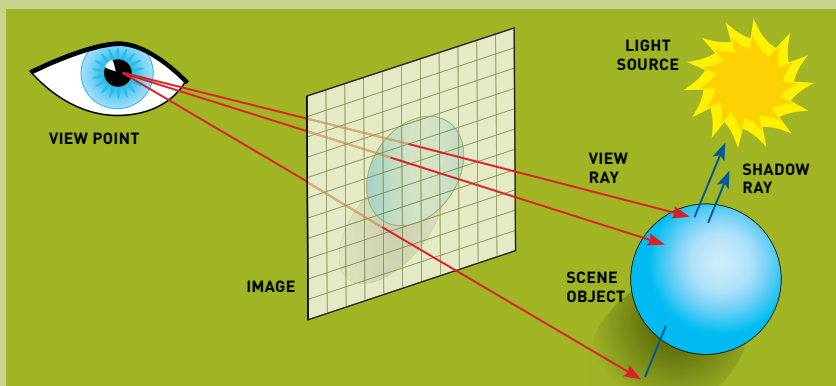
"Graphics in general is the grand art of cheating," Kirk notes, regardless of technique. "We're trying to approximate what nature does—tracing gazillions of photons around—by doing less work than that, because even the most sophisticated and powerful ray tracers don't trace billions of rays per second."

TOOLS FOR THE JOB

"This whole CPU versus GPU distinction is a little bit artificial," says Bill Mark, senior researcher at Intel's Corporate Technology Group. "Certainly you can build GPUs that have some CPU-like characteristics. Simi-

HOW IT WORKS

Rendering Pixels via Ray Tracing



In the real world, light comes from a source and bounces off surfaces. Some of the photons that reach your eye hit your retina, allowing you to see. Ray tracing works the other way, by casting rays back from the observer's viewpoint to determine which pixels it should render.

larly, you can build CPUs that have GPU-like characteristics." That said, ray tracing slightly favors current CPUs because those chips were designed for similar computations as the physics-based ray engines.

Jerry Bautista, co-director of Intel's Tera-scale computing research program, says, "There's no computational difference between tracing the path of a bullet and tracing the path of a light ray." That similarity could even lead to ray-tracing engines being recycled as a game's physics engine, saving programming and processing power. Bautista also notes, "General compute engines like a CPU are pretty well suited to physics kinds of problems, whereas a GPU is more of a stream compute engine and probably a little better suited to... processing triangles at a high speed."

Ultimately, hardware companies want software developers to have access to the fastest parts, regardless of renderer. Intel is developing its massively scalable, multicore Larrabee architecture. Nvidia is offering ways for game developers to run their own rendering code directly on the video hardware, allowing even those GPU devices to accelerate ray tracing.

BRIGHT FUTURE

According to Intel, hardware one to two generations away could render a complete, real-time scene with ray tracing. But nobody sees that as the goal. Nvidia's David Kirk says, "If you could do all ray tracing, would you? I don't think you would. There are many effects that you can do that involve diffuse kinds of lighting—that means softer, more inter-reflected kinds of lighting—that are horrendously [taxing]... to do with ray tracing."

The hardware companies want to give software developers more opportunities to write their own renderers, mixing and matching methods even within a single scene. Like the current process in many animated movies, a rasterizer could sketch in a game scene, while a ray tracer could add sharp reflections and details.

This mix-and-match approach seems to contradict an API standard, but Microsoft has already been heading toward this solution. DirectX even allows game developers to send programmable shaders directly to the graphics card, allowing open-ended acceleration regardless of the 3D engine. Chas Boyd, principal program manager for Windows Display and Graphics Technology notes, "In future releases, we will continue to increase the generality of [Direct3D], and thus offer developers even more flexibility in their choice of rendering methods." ☺

SanDisk Sansa e200

Even though it's two years old, the e200 remains one of the most feature-rich MP3 players we've tested. We pop the top to see what powers this beast

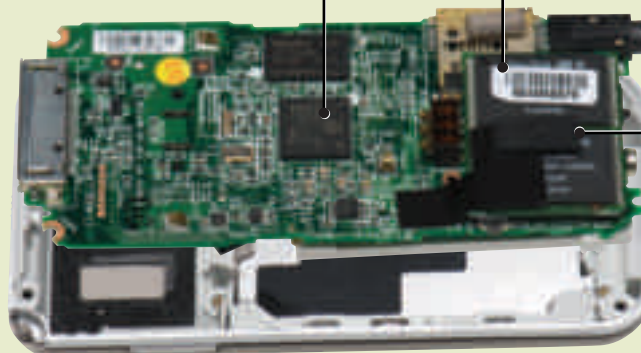


OCTAL BUFFER The LC244A chip inside the e200 is an octal buffer: It serves as a bridge between eight different pairs of circuits to keep a single circuit from being overwhelmed and affecting the operations of the others.

LCD The LCD panel is attached to an internal controller on the circuit board. This controller updates the panel's graphics using a direct-memory-access engine that pulls data from any of the e200's RAM buffers.

PROCESSOR The PP5024 is the e200's brain. The applications processor includes two 32-bit ARM7TDMI microprocessors that each feature 100MHz of processing power. The chip also has an onboard high-speed USB 2.0 controller and audio mixer.

MEMORY These two memory chips each hold 4GB of flash memory. The controller for both rests on the underside of the raised circuit board, and the board itself attaches to the e200 using a 40-pin connection.



FM TRANSMITTER Underneath the e200's two RAM modules is the device's FM transmitter, a tiny 5x5mm chip that's capable of supporting any FM reception-band standard worldwide, with the correct firmware.



SUBMIT YOUR IDEA Ever wonder what the inside of a power supply looks like? Don't take a chance on destroying your own rig; instead, let us do the dirty work. Tell us what we should crack open for a future autopsy by writing to comments@maximumpc.com.

HOW TO Create Your Own Internet Video Show

Join the ranks of Revision3, Gary Vaynerchuk, and all those zany lifecasters by becoming the star of your own two-camera webshow! —DAVID MURPHY



TIME = 35 MIN



WHAT YOU NEED

- **MIXING BOARD**
\$30-\$100, www.behringer.com
- **MXL 990 CONDENSER MICROPHONE**
\$60, www.mxlmics.com
- **ATR35S LAVALIER MICROPHONE**
\$40, www.audio-technica.com
- **TWO WEBCAMS**
\$100-\$200, www.logitech.com
- **ONE XLR CABLE**
\$10-\$20, www.musiciansfriend.com
- **1/8-INCH MALE TO TWO 1/4-INCH MALE Y CABLE**
\$10, www.musiciansfriend.com



Setting up a streaming TV show on the Internet is a pretty easy task. You grab a webcam, plug it into a PC, and use an Internet streaming site to host your amateur show. We're stressing the *amateur* part because let's face it, we've all seen enough YouTube stars to know the score.

But since this is *Maximum PC*, we're kicking it up a notch and showing you how to become an online video *producer*. First off, we're upping the number of cameras to two. Second, we're going to show you how to stream your video live. By using Ustream's (www.ustream.tv) online interface, you'll be able to switch back and forth between your two cameras. Give your audience two different views of your head! Or more likely, use the second camera to feature a special guest or sidekick.

However, switching the cameras and the input audio is a Herculean task for one Flash-based interface—plus, we scoff at built-in webcam microphones—so we're also using a condenser microphone, lavalier microphone, and mixing board. With them, you'll have better sound quality and you'll be able to adjust the microphones' levels on the fly, independent of your camera-switching efforts on your PC. It's the perfect way to up the production values of your show, and it will help you stand out without resorting to super-expensive, high-definition camcorders. Let's roll!



SUBMIT YOUR IDEA Have a great idea for a How To project? Tell us about it by writing to comments@maximumpc.com.



CONNECTING THE SOUND

1 We're using Behringer's MXB1002 mixing board for our setup, but feel free to select any mixing board that comes with the number of inputs you intend to use. For our setup, we need one XLR input (fat connector, three prongs) and a single 1/4-inch input. The condenser microphone provides the show's host with far better sound quality than what a typical USB headset or 1/8-inch microphone offers. The lavalier microphone is a perfect, less-expensive alternative for guests, and it gives you more mobility if you need to stray from your desk for a segment.

As for the mixing board, you can opt for a fancier model to give yourself the option of more guests, or you can just go for a cheaper model with the bare essentials. You won't see a difference in quality at this price level, just connection options.

Connecting the microphones to the board is simple. For the XLR microphone (top image), plug one end of the male connector into the mic and the other end into the first position on the mixing board. The lavalier mic we've chosen, Audio-Technica's ATR35s, comes with a converter that allows us to plug its 1/8-inch connector into the second channel's 1/4-inch line-in on our mixing board (bottom image). Finally, to get the audio to our PC, we're attaching our Y cable's 1/4-inch connectors to the left and right outputs on the board and the cable's 1/8-inch end to the microphone input on our motherboard.



CONNECTING THE CAMERAS

2 Physically installing the webcams is pretty straightforward. We recommend you do it systematically, to prevent your OS from freaking out, especially if you're using webcams from different manufacturers.

Start by connecting the first webcam to your rig and then installing the accompanying drivers from either the provided CD or a packaged download. Depending on your camera, you might be given the option to enable a face-tracking feature. We recommend you resist the urge to enable this or any special effects. They'll make your show look lame at best, and at worst, the jittering of the automatic lens seeking out your mug will annoy viewers to the point of turning off your show.

Once you have your first webcam up and running, attach the second one. If it's the same make and model, the software interface should allow you to toggle between the two as-is. If not, install the drivers for your second webcam. They should be compatible, but if you want to experiment with live-feeding the images from both cameras at the same time, the two apps will have to run simultaneously.

All that matters at this point is that you can operate two cameras. Check both to see that they produce images, place the cameras where you want them to broadcast from, and proceed to Step 3!

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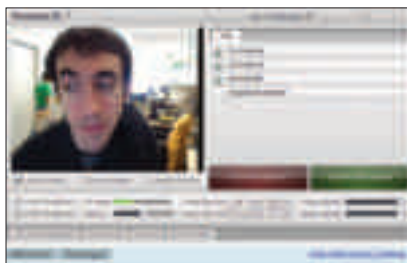
SETTING UP THE SHOW

3 We're using Ustream.tv to host our streaming show because of its smorgasbord of options, both behind the scenes and embedded into the broadcasting interface. Setting up an account is easy. Just go to www.ustream.tv and click the Log In/Sign Up button in the upper-right corner. Once you've entered your personal information, you'll be taken to a show configuration screen.

This menu allows you to configure the basics of your show—such as its name and logo—as well as tags and an HTML-based description. If you want to tackle some of the advanced configuration options available, cycle through the tabs on the top of the screen. In the Design tab, you can edit the color scheme and fonts of your show's main page. And if you already have favorite shows on Ustream, you can add links to them below your show.

The Sharing tab is the hub for propagating your show across the Internet. You can use this portion of the options menu to post information about your show to your favorite web 2.0 websites, Twitter your friends, or import your email contacts and send them notes about your production.

Finally, the Advanced tab allows you to configure your show's accompanying chat room. You can turn commenting on or off, but more importantly, you can assign other Ustream users to serve as chat moderators. This is also where you set permissions for co-hosting, in case you ever want to share the spotlight with other Internet buddies.



BROADCASTING

4 Once you're ready to go live, click the big Broadcast Now button in the upper-right corner of Ustream's website. A window will pop up, showing you the feed from one of your cams. Make sure that both Audio and Video Broadcast are checked and that the audio source is the microphone input on your motherboard or soundcard. Don't forget to adjust the video and audio quality if you have to, depending on the speed of your connection.

Click the Advanced Settings tab in the lower-left corner. We recommend you leave the frame-rate option as it is and instead use the slider bars on the main broadcasting screen to adjust your show's quality levels. Click the option that asks if you're using a mixing board. And while you're here, check out the other options: The Create Poll feature is a handy way to interact with your chat room audience, and the Cohost tab allows you to bring live guests into your show's mix.

When you're done mucking around, click the Close button to head back to the main broadcasting screen. You can switch your camera input by selecting a new video source—it's right above the audio source option you set earlier. There will be a bit of a delay as the image switches over, and the corresponding software for each webcam (if they're different models) might load when you switch. Keep the webcam software windows open, and use this switch to shift back and forth between your cameras.



ROCKIN' THE BOARDS

5 Each channel on a mixer comes with a number of inputs—in our case, an XLR and a line-in for left and right channels. Below the channel are the various knobs that control the sound itself. The ones you need to concern yourself with are the equalizer settings—the Low, Mid, and Hi knobs—and the Gain knob, which controls the signal's amplification. The fader slides up and down to control the level of sound that routes to the mixer's main output.

Start by turning all of the knobs in the channel to their zero settings—the notches should be facing up. Only the Gain knob is different: Its zero requires you to turn the knob all the way to the left. Now move the channel fader and the board's main fader from their lowest levels up. Your mixer should have LED lights that indicate the level of sound that's passing out of the board: You're aiming to have the loudest parts of your broadcast just barely blip past 0, usually signified by the briefest of flickers on one of the board's yellow lights.

We recommend you pick a point for your main fader—the number varies depending on your mixer, but the fader should be about 75 percent of the way up from the bottom—and play with the channel fader until you're comfortable with the volume. You can also adjust the Gain to increase volume, but pushing it too far will add artificial noises and clipping to your stream. When you're ready to go, click Start Broadcast in Ustream and start talking! 🗣️

STREAMING ALTERNATIVES

Ustream's Not the Only Game in Town

You can use Justin.tv (www.justin.tv) and Y! Live (live.yahoo.com) as alternate streaming options, but they're less feature-packed than Ustream. The former lets you edit image quality, record episodes, and send Twitter messages to friends in its GUI, but that's it. Yahoo Live offers a bit more. It provides your web show with its own chat channel that allows you to see the video streams of up to four other users on your show's main page. It's a great way to keep the conversation alive among your listeners. Ustream supports only text chat, not video.

This month the Doctor tackles...

▶ Setting Your Processor Affinity

▶ PSU Problems

▶ Overheating Laptops



To Affinity and Beyond!

I just completed a minor upgrade to my system, including the addition of a brand-spankin'-new Intel Core 2 Quad Q6600 CPU. My question: When you right-click a process in task manager it gives you the option to set affinity. If I'm right, this gives you the ability to set a process or task to a particular core of your CPU.

It seems like this would help distribute the load of everything running and keep things flowing smoothly, but it looks like every process is set to use all four cores.

Is there a right or wrong way to go about changing these settings? Is it advisable to change them? I would think that if you divided them up, you could gain a performance advantage.

—Michael Seymour

The Doctor has not manually set the affinity for an application, but he doubts that it would yield any performance benefit that would be worth the time spent setting the affinity of each program on your machine. You'd also have to reset the affinity each time you started the application. While this can be done automatically with Innes.org's ROPE utility, it's a moot point. The Doctor thinks it's best to let the OS handle thread-scheduling.

Steady Dell Decline

I'm stuck with a Dell laptop that now fails to boot after

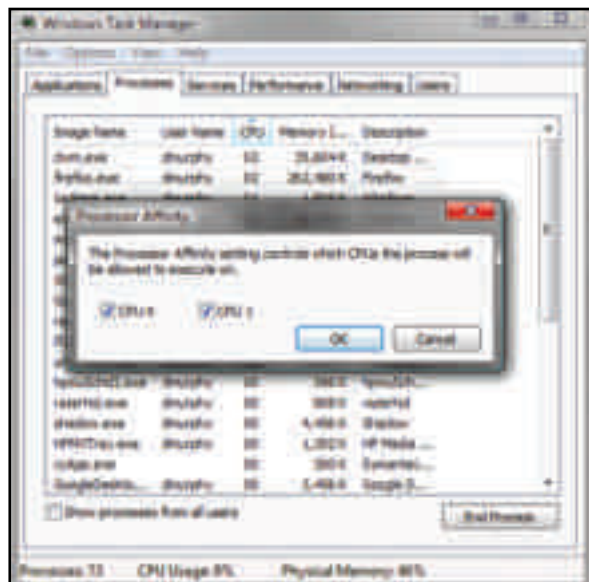
just two weeks of normal use. I can accept the fact that I will probably fight with Dell technical support for six months before they do anything to help. What I can't accept is that I can't figure out what is wrong with this box.

Quite simply, using the laptop for an extended period results in incredibly slow performance, which leads to a lockup or blue screen, which leads to Windows no longer booting on the next cold restart. The ensuing error messages are varied and too numerous to list. After a clean install of Windows, every single diagnostic from the Dell CD comes back perfect. Memtest86 returns no errors.

I've swapped out hard drives and CD drives. But after two weeks, the result is exactly the same: no boot. I've tried other "unsupported operating systems" (read: Ubuntu), but they crash and burn just the same. If a Dell technician tells me to reinstall XP Home one more time, I may go postal!

—Jay Minard

This sounds like a classic case of overheating. Perhaps an errant factory worker didn't put enough thermal paste on the heat pipe and CPU. You should also see if anything is obstructing the laptop's exhaust port. Regardless of the reason for the overheating, you should continue



You can change processor affinities in Windows Task Manager, but for optimal performance, let Windows handle the CPU tasks.

to work with Dell to replace the notebook since it is still under warranty and there is no reason this problem should be occurring.

You definitely shouldn't attempt to repair the computer yourself. While a thermal paste issue is relatively easy to fix on a desktop machine, trying to pop the bits and pieces out of your laptop to access the processor area is quite a task—and it would void your warranty. If you don't feel like talking to Dell's customer service, try going to www.support.dell.com and using the online chat service—you might get better results.

Seriously, Power On!

I built a computer about a year ago and everything has

been working fine—except one thing. When I turn the computer on in the morning, after it's been off all night, it starts and then immediately shuts down.

If I push the power button again, the machine boots normally. I've experimented with holding down the power button for various durations, from one second to three seconds, but it doesn't seem to make a difference. If I push it once, the rig starts and shuts down. If I push it again, it starts and runs normally.

I don't have hibernation enabled; I do have the latest BIOS. Nothing is overclocked, and there aren't any other problems. The front-panel connectors—and all the other connectors—are snug. It's

plugged into an APC UPS that's oversized, if anything.

Does this sound like a PSU problem? Perhaps it's a tad undersized? I tend to stick with Antec, as it is the one brand I've never had any problems with.

—Steve G.

The Doctor suspects the issue may be related to the power supply and your motherboard, specifically the Power Good signal. When you boot your PC, the power supply starts up, conducts a self-test, then generates a signal to the motherboard that it is OK to start. During the motherboard's startup, the PSU's voltages should settle down to spec.

The Doctor suspects that your PSU is booting and sending the signal. The machine then starts to boot, sending the voltages out of spec for a second while all of your peripherals start to spin up. The power supply then notices that the voltages are

Locked Resolutions

I have a custom-built machine running Vista Ultimate that uses an Nvidia graphics card and a Sony monitor. I can't change the resolution from 1024x768 (or sometimes 800x600) to a higher one. I tried Personalize > Display Settings in the Control Panel, but using the Nvidia control panel made only temporary changes. What are the possible fixes if I don't want to get a new graphics card or a new monitor?

—Jesse Wu

This type of problem is usually caused by outdated video-card drivers. Luckily, there's a simple solution: Head over to Nvidia's website and grab the latest drivers for your card.

You'll also want to go to <http://tinyurl.com/2sq2ks> and pick up Guru3D's driver sweeping utility. Go to your Control Panel and uninstall the video-card drivers you're currently



If you can choose from only two or three resolutions on your display panel, something's wrong: Modern cards are able to support far more resolutions than that.

IF A DELL TECHNICIAN TELLS ME TO REINSTALL XP HOME ONE MORE TIME, I MAY GO POSTAL!

incorrect and withdraws the Power Good signal to shut the machine down.

Machines with this issue do tend to have undersized power supplies. It's also possible that the Power Good signal is slightly out of sync with the motherboard, which can contribute to flaky start issues. Swapping the power supply out for a larger unit will likely solve your problem.

running. Reboot your machine into safe mode and use Guru3D's utility to remove the "NVIDIA-Display" drivers.

Reboot a second time into a normal operating system, not safe mode. You'll be starting at an ugly VGA display mode. Ignore that. Go ahead and install the new drivers for your graphics card. When Windows restarts, you'll be able to access a number of additional resolutions for your display.

RAID Replacement

I want to use a RAID array for backup and storage, but what happens if the electronics fail? I get the impression that the low-cost consumer products have a single point of failure—the controller.

I assume RAID implementation isn't standardized to allow you to recover by transferring the drives to a different platform. The closest I found to "standards" are either Intel's Matrix Storage Technology or Windows Home Server boxes.

I'm trying to avoid investment in a standby controller but don't see an easy way to protect data on these devices short of frequent backups, which I want to minimize by using RAID 1 (or a variant) in the first place.

—Mike H.

The Doctor, skilled as he may be, would never prep a computer for any kind of RAID transplant surgery. When the controller goes, you have a very slim chance of finding a suitable replacement that could manage the array. It's certainly possible: You would need to purchase an identical RAID controller, and the controller would need to run the exact same firmware. Even the most minor of variations in a physical model or a driver could be enough to ruin the equation.

So, no, there is no easy way to back up a RAID controller—short of buying an identical card and configuring it the same way. As for your data, remember that RAID 1 isn't a backup, it's a replication. An independent, software-based backup is your ticket, because any file errors, viruses, or accidental deletions on one drive in a RAID 1 array will mirror over to the second. See the problem? ☹



SUBMIT YOUR QUESTION Are flames shooting out of the back of your rig? First, grab a fire extinguisher and douse the flames. Once the pyrotechnic display has fizzled, email the doctor at doctor@maximumpc.com for advice on how to solve your technological woes.

REVIEWS

Tested. Reviewed. Verdictized

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- PLUS
Best of the Best, Editors' Blogs,
and the No BS Podcast



MSI P35 Combo Platinum

DDR2 or DDR3—it's your choice!

You can change CPU sockets, dump PCI, and jettison legacy ports all day long, but nothing, absolutely nothing, pisses people off like moving to a new type of RAM. Luckily, there's a fallback: dual-format RAM motherboards such as MSI's P35 Combo Platinum board.

Based on Intel's P35 chipset, the Combo Platinum will take up to four DDR2 modules or two DDR3 modules. But don't think about running them simultaneously—it's impossible. You'll also have to run a pair of funky blank adapters to get the board running.

The Combo Platinum performed quite well

(unlike most combo boards we've tested), with scores on par with or slightly better than those of the Intel and Gigabyte X48 DDR3 boards we reviewed in the July issue. Why? We run our DDR3 board tests with fairly relaxed RAM timings to eliminate stability issues. We're certain that the X48 boards would be faster if we pushed the RAM timings a bit.

Now for the big question: How do the DDR2 and DDR3 modes compare? We tested the board at DDR2/800 and DDR3/1333 and saw DDR3 outperform DDR2 by about 4 percent in most benchmarks. That's not bad.

Overclocking, however, was only fair. We pushed our Core 2 Quad Q9300 from its stock 333MHz front-side bus to about 450MHz but couldn't break the 500MHz mark, which we did easily with the Asus Striker Extreme II board (July 2008). That board, however, costs more than \$300.

The Combo Platinum's biggest downside is SATA placement. A large GPU, such as a GeForce 9800 GTX, will block two of the five ports. The

VERDICT

8

MSI P35 COMBO PLATINUM

+ XB-70

Good performance for a pretty reasonable price.

- B-58

You can run DDR2 or DDR3, but is that really a big deal?

\$160, www.msicomputer.com

mobo was also finicky with our DDR2 modules and would not hit DDR2/1066 speeds.

The real question you should ask yourself is if purchasing this board makes any sense. If you have a boatload of DDR2, you're better off buying a DDR2-only P35 board. Are you really going to throw away your existing DDR2 RAM and buy DDR3 in 12 months? Probably not.

Still, we understand the appeal of the upgrade path, and warts aside, the board's performance is certainly respectable.

—GORDON MAH UNG

BENCHMARKS

	MSI P35 Combo (DDR3 mode)	MSI P35 Combo (DDR2 mode)	Intel DX48BT2
PCMark 2005	8,729	8,826	8,432
3DMark06 Overall	12,756	12,732	12,268
ScienceMark 2.0 Mem	6,291	6,110	6,550
Valve Particle test (fps)	97	93	91
UT3 (fps)	117	110	104
FEAR (fps)	261	250	247
Quake 4 (fps)	177	172	174

Best scores are bolded. Our test bed consists of a Core 2 Quad Q9300, a GeForce 9800 GTX, a Western Digital Raptor 150, Windows XP Pro, and Corsair Dominator DDR2 and DDR3 RAM.

The P35 Combo Platinum uses RAM cards to let it run either DDR2 or DDR3.



Lite On 4x Blu-ray Triple Writer DH-4B1S

A drive that's made zero strides since its aged predecessor

It doesn't matter a lick to us that Blu-ray has prevailed in the high-def format war if the hardware remains expensive and uninspiring. We have to admit, we thought the tide was turning when we reviewed LG's GGW-H20L Blu-ray burner back in December. That drive represented a dramatic price drop (falling to \$500 from its predecessor's \$1,200 price tag in a matter of months—and now settled at \$400 MSRP), and its 6x rating for BD-R media resulted in burn times we could actually live with (22.5GB in a little over 20 minutes).

Sadly, Lite On has not followed LG's lead. True, the company's latest Blu-ray burner is cheaper than the Lite On LH-2B1S we reviewed in July 2007 (\$450 vs. \$600) and has a faster BD-R write rating (4x vs. 2x), but we're not the least bit moved by these changes. For start-

ers, the new DH-4B1S is still more expensive than the aforementioned LG GGW-H20L, and its "improved" BD-R rating has actually made burning to that media slower! It took us 48:00 (min:sec) to burn 22.5GB to a single-layer disc. Certain this was a mistake, we ran the test again—for a time of 48:14! (With the 2x Lite On drive, this very task took just 46:14.) The DH-4B1S was actually faster burning to BD-RE media—where it's rated at just 2x—writing 22.5GB to a rewriteable disc in 46:12.

With such pathetic Blu-ray performance, it might seem moot to discuss the DH-4B1S's other attributes, such as DVD burn times, but here you have it: The drive is rated at 12x for DVD+R single-layer discs; in our tests, it wrote 4.38GB of data to that media in 7:09 (min:sec). That's a decent time, but LG's GGW-H20L,

which is rated at 16x, took just 5:40 to complete this task.

Like all the Blu-ray burners we've ever tested, the DH-4B1S comes bundled with a collection of CyberLink applications for backup, copying, playback, and authoring chores. We can't hold the drive responsible, but we'd appreciate CyberLink's software more if it weren't so twitchy.

Aesthetically, the drive is pretty standard, although it does sport an LED strip across its front that signifies drive operation and whether it's working with CD, DVD, or BD media. The DH-4B1S smartly sports a SATA interface.

We always expect technology to progress by leaps and bounds, but a drive such as this makes us feel like Blu-ray is at a standstill.

—KATHERINE STEVENSON

Lite On's new drive may sport a faster 4x BD-R write rating, but it performs worse than its 2x kin.

BENCHMARKS

	Lite On DH-4B1S	LG GGW-H20LI
DVD Write Speed Average	8.99x	12.09x
DVD Read Speed Average	9.10x	9.24x
Access Time (Random/Full)	137ms/213ms	99ms/192ms
CPU Utilization (8x)	31%	23%
Time to burn 22.5GB to BD-R (min:sec)	48.00	21:23
Time to burn 22.5GB to BD-RE (min:sec)	46:12	39:38

Best scores are bolded. All tests were conducted using the latest version of Nero CD-DVD Speed and Verbatim media. Our test bed is a Windows XP SP2 machine using a 2.66GHz Intel Core 2 Quad Q6700, 2GB of Corsair DDR2/800 RAM on an EVGA 680 SLI motherboard, one EVGA GeForce 8800 GTS card, a Western Digital 500GB Caviar hard drive, and a PC Power and Cooling Turbo Cool PSU.



VERDICT

5

LITE ON 4X BLU-RAY TRIPLE WRITER

+ PANDA BEAR

Not-so-outrageous price, decent DVD burn speed, SATA interface.

- PANDEMONIUM

Still too expensive, DVD burns could be better, BD-R burn speeds suck.

\$450, www.liteonit.com

Cooler Master Aquagate Max

This Maximus of coolers gets an emperor's thumbs up

We never said water cooling was simple, and Cooler Master's Aquagate Max doesn't make the delicate assembly process any easier. But once you connect your last run of 3/8-inch tubing to this beastly setup, you'll have accomplished two goals: doubling your geek cred and giving your processor an awesome heap of non-peltier cooling.

Both the kit's 120-gallon-per-hour pump and 260ml reservoir fit within a monstrous black-and-green enclosure that takes up two 5.25-inch bays. Two holes on the enclosure's face indicate how much fluid is in your reservoir and allow you to wonder why the Aquagate's flow indicator is spinning so slowly. The pump is half as strong as the market's best (the Laing D5), but it's still powerful, leading us to believe that the indicator is improperly placed if Cooler Master intended for it to do anything more than sluggishly rotate.

This is the first Enthusiast System Architecture-certified water-cooling device we've tested. Two sensors you

attach to the tubing report information back to an Nvidia software GUI, which lets you adjust the speed of the two 12cm fans attached to the Aquagate's 30x14x7cm aluminum radiator. The only other information presented in the GUI is the temperature of the coolant and the reservoir's fluid level; we expected far more options than that, such as the ability to control pump RPMs or automatically vary fan speeds against temperatures.

While the din of the Aquagate's fans will keep your neighbors up at night, the cooler performs impressively. It cools a bit better than the best air cooler we've tested, Thermaltake's DuOrb (July 2008), in both our CPU idle and burn-in tests. And its large size allows it to bully smaller all-in-one water-cooling kits—like its predecessor, the Aquagate S1—right off the benchmark chart.

The installation process is taxing, but the cooler's overall prowess is worth the payoff, making the Aquagate Max our

BENCHMARKS

	CM Aquagate Max	Thermaltake DuOrb	Stock Cooler
Idle (C)	32.0	34.0	40.0
100% Burn (C)	32.0	34.0	40.0

Best scores are bolded. Idle temperatures were measured after an hour of inactivity. Load temperatures were measured after an hour's worth of CPU Burn-In (four instances). Test system consists of a stock-clock Q6700 processor on an EVGA 680i motherboard.

water-cooling kit of choice. But if ESA is where the future of cooling is headed, we're curious to see what other manufacturers, or even a Cooler Master firmware update, might offer. —DAVID MURPHY

VERDICT

9

COOLER MASTER AQUAGATE MAX

+

ROME

Powerful cooling, beautiful appearance, software-based control of fan speeds.

+

SPARTA

Meager ESA functionality; short fan cords force you to mount radiator near reservoir.

\$230, www.coolermaster.com

The Aquagate Max comes with its own coolant additive that gives the kit a neon-green glow.

Qnap TS-409 Pro

Our favorite NAS box expands to four drives

Is bigger always better? Not necessarily. Qnap's TS-409 Pro is packed with the same features as the company's TS-109 Pro (<http://tinyurl.com/yomys5>) but includes twice as much memory and supports four hard drives rather than just one. And it rocks, but only if we compare it to similarly sized foes, such as Buffalo's four-drive TeraStation Live.

The TS-409 Pro is the fastest multiple-drive NAS box we've tested, producing excellent scores in our read and write

benchmarks. But the same can't be said when we expand the field to include single-drive NAS devices.

Qnap's own TS-109 Pro overtakes the TS-409 Pro in half of our transfer benchmarks. We didn't expect this since the hardware in the two products is almost identical. If anything, the TS-409 Pro should trounce its predecessor, thanks to an additional 128MB of onboard DDR2 memory.

It's no surprise that the devices' administration software is also nearly identical. However, since it supports multiple drives, the TS-409 allows you to configure RAID levels; other additions include support for hard-drive SMART statistics and a new way to schedule backups to connected USB devices. We would have liked even more improvements, such as a more streamlined



VERDICT **8**

QNAP TS-409 PRO

+ CATNAP

Fastest of the larger NAS boxes; incredibly detailed administrative options.

- CATNIP

A size upgrade over the TS-109 Pro, and that's it; slower than its predecessor.

\$600, www.qnap.com

interface for easier use, a better downloading application, and a one-button approach for backing up one internal drive to another.

Qnap downgrades the NAS experience by stripping functionality out of the TS-109 Pro and packaging these features into external software applications for the TS-409 Pro. You now manage FTP, HTTP, and BitTorrent downloads using the QGet program. We'd much prefer a client with the functionality of Azureus or uTorrent—QGet lacks scheduling and tweaking options.

The included Netback Replicator is a great one-click backup application but a poor synchronization app since it goes only one way: You can't sync a folder on the TS-409 Pro to your computer. The program only copies files you dump into a folder on your machine to a folder of your choice on the TS-409 Pro.

The TS-409 Pro is the best multi-drive NAS box we've tested, but that doesn't mean it's perfect. Since Qnap is upgrading all of its other NAS devices, it might be worth waiting to see if the company spruces up this one as well. —DAVID MURPHY

BENCHMARKS

	Qnap TS-409 Pro	Qnap TS-109 Pro	Buffalo TeraStation Live
Size	N/A	N/A	2TB
PC to NAS, small (min:sec)	0:45	0:37	1:05
PC to NAS, large (min:sec)	3:04	2:25	3:50
NAS to PC, small (min:sec)	0:33	0:43	1:20
NAS to PC, large (min:sec)	1:45	2:44	5:16

Best scores are bolded. We used the CD contents of Maximum PC's November 2007 CD for the small-file testing, and a single 3GB file for the large-file testing. All scores are averages of three transfer trials.

The TS-409 Pro doesn't include any additional connections over the TS-109 Pro. In fact, you lose an eSATA port.

LG W2452T

Getting the band(ing) back together

We were excited when LG's W2452T arrived in the Lab—we had high hopes this monitor would break the streak of middle-of-the-road 24-inch displays we've tested lately. And it nearly did. Although the 1920x1200-res screen was able to hit the grayscale extremes on our DisplayMate tests, this functionality came at a horrible price: noticeable compression when given an increased range of grayscales to work with.

And then the LCD monitor turned to mush.

LG's W2452T suffers from noticeable banding issues—the ugly streaks that disrupt what should be a smooth gradient. It was quite bad on a few of our high-definition photos, but the problem was especially frustrating in our gaming tests. Nothing ruins a good fog effect like large, chunky lines bisecting the image.

The monitor's coloration is acceptable, but not great. We didn't expect overwhelming vibrancy from this display, which performs like a 6-bit panel, so we weren't surprised when the monitor failed to produce images

as vivid as those of other displays. Overall, the W2452T's picture is a bit muted when using the display's normal settings. Adjusting the settings did little to improve the image, and heaven forbid you use the display's presets. The movie and demo modes saturated the colors so much that they turned normal video into an acid trip.

LG spent a little too much time on the monitor's funny features: We see no need for a zoom effect, nor would we ever want to switch our display over to a sepia tone. Instead of these additions, LG should have included more connections on the display, as just a single DVI and VGA port are provided. And be careful adjusting the monitor's angle, the stand is wobbly.

The W2452T creates a good basic image, but tweaking the monitor to achieve better coloration leaves a little—or in some cases, a lot—to be desired. —DAVID MURPHY



A host of silly sound effects are produced whenever you press the monitor's front buttons—it's the first thing we turned off.

VERDICT 6	
LG W2452T	
ROCK BAND	GARAGE BAND
Great grayscales and average not great coloration.	Banding affects image quality and preset options can completely destroy the picture.
\$550, www.lge.com	

In Win B2

Tower, this is Ghost Rider: requesting a flyby

In Win can't resist building gimmicks into its chassis. We first encountered the company's design oddities with its F430 case (reviewed July 2008), which emits the superloud sound of a car engine when you hit the power button. The company's B2 chassis isn't quite as ostentatious—unless you think the motorized front panel that conceals the drive bays is over the top.

This midtower chassis does, however, take its B2 theme to extreme levels. The vent

on the case's snap-locking side panel looks just like a Stealth bomber and the case's exterior is peppered with aeronautical jargon. We love the look, but working in this case is a different story.

A VGA cooling bracket with two attached 8cm fans runs along the side of the case. It pivots up and down to give you access to your rig's insides but leaves little room for connecting additional power-supply cables to your videocard. Back-end connections similarly suffer, as this chassis is a bit cramped—heave and strain all you want, an oversized next-gen videocard isn't going to fit in here.

Labeled drive rails sit on a tray in one of case's four 5.25-inch bays. It's great that the B2 doesn't need any screws whatsoever, but we'd rather receive the rails in a bag to simplify installation. Also, the end of the tray sticks out a little too far. We had to remove it—by first removing the case's side and front panels—before we could squeeze our motherboard into the chassis.



A side flap conceals the B2's front-panel connections: two eSATA, two USB, one FireWire port, and one HD/AC97 audio jack.

We appreciate the case's features, including its support for up to five hard drives, superb air cooling, and luxurious front-panel connections, but the B2's peculiarities force us to ground it for all enthusiast rig-building missions. It's better suited for midrange machines. —DAVID MURPHY

VERDICT 7	
IN WIN B2	
GOOSE	MAVERICK
Pivoting hard-drive bay, easy-to-remove side panels, two 12cm fans.	Tight fit inside case worsened by VGA cooling bracket; removable drive-rail tray.
\$130, www.in-win.us	

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Mass Effect

A truly stellar science fiction epic

Fans of *Star Wars* and *Star Trek* finally have a role-playing game that's worthy of their love. *Mass Effect* takes the most compelling themes and ideas of both franchises and mind-melds them into one of the best science fiction games we've ever played.

After fleshing out our digital avatar with the robust character customization engine (we created a bad-ass female war hero), we dove into an engaging story that put the fate of the galaxy in our hands. The primary quest charged us

with investigating the reemergence of a long-lost race of machines that wiped out an entire species of advanced aliens 50,000 years ago. Through the 20-hour campaign, we explored numerous planets, resolved alien conspiracies, and forged relationships with a believable cast of NPC allies.

Mass Effect's rich selection of side quests helps flesh out the main story, and we loved the innovative conversation system. Dialogue trees are presented in an intuitive radial selection circle that lets us steer conversations in a plethora of directions depending on the tone of our language—all the characters are amazingly voice-acted as well.

When talking couldn't get the job done, we turned to the fast-paced combat system, which actually requires some skill. Aiming with a mouse helped us survive firefights, and the



Character feats like Lift and Warp let you throw enemies off guard—just don't call them Force powers

newly designed PC combat interface is much better than the Xbox 360 version's. It's too bad the inventory system hasn't been improved—rifling through hundreds of weapon upgrades in the equipment menu is a drag.

But we forgot about the game's little annoyances after being immersed in the gorgeous high-resolution graphics—*Mass Effect* runs smoothly at 2560x1600 resolution (though turning off the "film grain" option is recommended).

Mass Effect's epic story is both moving and fulfilling; the game's universe is rich with details and feels infused with life. We can't wait for the inevitable sequel. —NORMAN CHAN



MASS EFFECT

VERDICT

9

+ DEEP SPACE NINE

Engrossing campaign, great dialog system, visually striking environment and alien designs.

- TEROK NOR

Messy inventory system, some pointless locations, only one ending.

\$50, www.masseffect.com, ESRB: M

LAB NOTES

The GeForce GTX 200 Series

Nvidia: Kicking ass or kicking the can down the road?

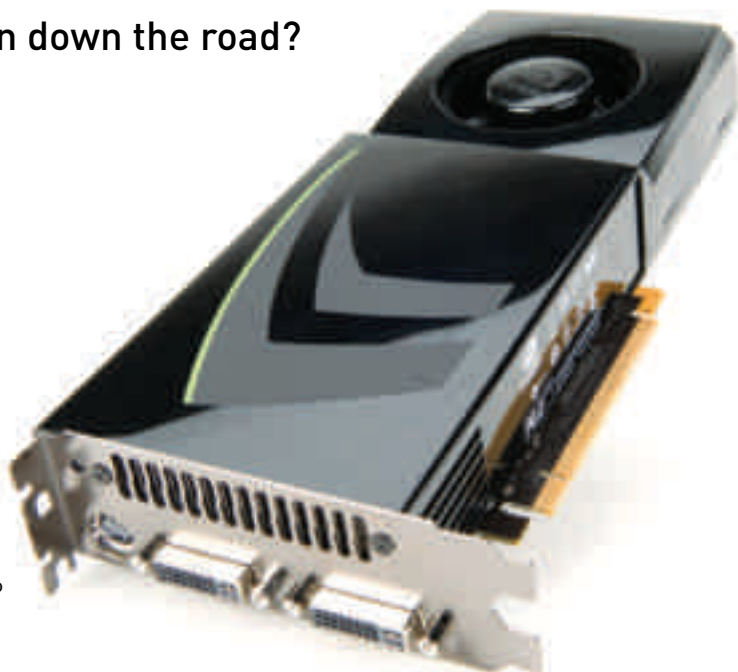
Rumor has it the GeForce GTX 280 and GeForce GTX 260, as powerful as they seem to be, won't be long for this world.

Several aspects of the new chips' design lend credence to that bit of gossip. Building a chip with 1.4 billion transistors using a 65nm manufacturing process, after all, will result in a massively large die. The bigger the die, the lower the yield and the higher the manufacturing cost. The large die size might also explain why the GTX 280's core is clocked at just 602MHz—running faster would require a larger and more expensive cooling apparatus.

Size isn't everything, of course: AMD's move to a 55nm process last year didn't help the Radeon 3800 series catch up with Nvidia, and the GTX 200 series will only widen the performance gap. We can't make a purchase recommendation until we've tested a shipping product, but we suspect this might be one of those times it's worth waiting a month or two to see what happens next.

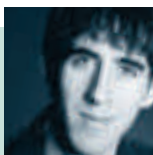


MICHAEL BROWN
EDITOR-AT-LARGE



WILL SMITH
EDITOR-IN-CHIEF

I got to spend some quality time with the new Astro Gaming headset this month. I'll post a full write-up online, but I'm impressed with both the quality and the convenience of this headset on steroids; it's designed for folks who play on consoles and the PC. It's too bad it's so goofy looking.



DAVID MURPHY
ASSOCIATE EDITOR

I've been testing the effects of XP's new SP3 service pack and Vista SP1 on our benchmarks. I've also been testing the effects of a Necromancer on the monsters inside Age of Conan's Aquilonia. Each is as time-consuming (and awesome) as the other, although I'm pretty confident that the former have fewer bugs than the latter.



KATHERINE STEVENSON
DEPUTY EDITOR

After getting a new computer, I became determined to organize all my digital photos before moving them to their new digs. What a massive undertaking that's been! Inconsistent labeling habits, a penchant for storing duplicate photos in multiple places, and other acts of storage shortsightedness are all coming home to roost.



GORDON MAH UNG
SENIOR EDITOR

The MSI mobo I reviewed in this issue provided the best experience I've ever had with a combo board. Even so, I think most people should just suck it down and either adopt DDR3 or stick with DDR2. These half-step boards make you feel better but rarely pay off in the long run.



TOM EDWARDS
MANAGING EDITOR

While my coworkers may say otherwise, the truth is the entire staff has devoted all of their time in the Lab to playing Age of Conan. In fact, it's a miracle this issue was even completed considering the hours spent creating characters and leveling up. Expect much more of the same next month.

Win e Month

**IF YOUR MODDED PC IS CHOSEN
AS A RIG OF THE MONTH, IT WILL:**

▶ **2** Win you a \$250 gift certificate

TO ENTER: Your submission packet must contain your name, street address, and daytime phone number; no fewer than three high-res JPEGs (minimum size 1024x768) of your modified PC; and a 300-word description of what your PC represents and how it was modified. Emailed submissions should be sent to rig@maximumpc.com. Snail mail submissions should be sent to Rig of the Month, c/o Maximum PC, 4000 Shoreline Court, Suite 400, South San Francisco, CA 94080.

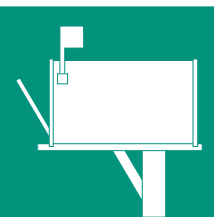
The judges will be *Maximum PC* editors, and they will base their decision on the following criteria: creativity and craftsmanship.

ONE ENTRY PER HOUSEHOLD. Your contest entry will be valid until (1) six months after its submission or (2) the contest ends, whichever date is earlier. Each month a winner will be chosen from the existing pool of valid entries, and featured in the Rig of the Month department of the magazine. The final winner in this contest will be announced in the March 2008 issue. Each of the judging criteria (creativity and craftsmanship) will be weighed equally at 50 percent. By entering this contest you agree that Future US, Inc. may use your name and your mod's likeness for promotional purposes without further payment. All prizes will be awarded and no minimum number of entries is required. Prizes won by minors will be awarded to their parents or legal guardians. Future US, Inc. is not responsible for damages or expenses that the winners might incur as a result of the Contest or the receipt of a prize, and winners are responsible for income taxes based on the value of the prize received. A list of winners may also be obtained by sending a stamped, self-addressed envelope to Future US, Inc. c/o Maximum PC Rig of the Month, 4000 Shoreline Ct, Suite 400, South San Francisco, CA 94080. This contest is limited to residents of the United States. No purchase necessary; void in Arizona, Maryland, Vermont, Puerto Rico, and where prohibited by law.



We tackle tough reader questions on...

► A Desktop Hack ► LED Safety ► Our Magazine's New Design



New Use for an Old Notebook

Reading about hacking a PDA to extend your desktop in the July issue ("Hack Your Hardware") piqued my interest. However, not having an old PDA lying around, I settled for the next best thing, an old notebook. Talk about desktop real estate on the cheap! A Google search uncovered two software solutions that both work over the network: a freeware application called ZoneOS ZoneScreen (<http://tinyurl.com/5gmw6j>), and an app called MaxiVista (\$30-\$70, www.maxivista.com). ZoneScreen only works with XP, which limits options on older hardware. MaxiVista will work on extremely obsolete hardware and is very customizable. With the demo version, I was able to extend my desktop onto an old ThinkPad—and by old, I mean a Pentium 133MHz with 16MB of RAM and Windows 98! After optimizing the settings (an automated feature), I was able to use it effectively, with very little lag between screens.

MaxiVista can even invert the screen on the extended desktop, meaning I could mount this notebook upside-down and have a nifty fold-down display next to my other monitor. This is a great (and cheap) solution for more desktop space and puts older legacy hardware to good use.

—Louis Wegner

Online Editor Norman Chan

Responds: Thanks for the tip, Louis. ZoneScreen and MaxiVista are both pretty sweet applications—especially since they work over a network connection and support multiple laptop monitor extensions. Imagine the space you'd gain by stringing three portables off the side of your main monitor!

A Reader Re-Volts

In your July 2008 "Hack Your Hardware" story, you describe replacing an LED with one of another color. You suggested testing the LED's polarity on a 9V battery. I would strongly advise against using a 9V battery! Other than blinding yourself or a passerby, 9V can easily fry the LED.

A typical LED operates at 2V (red) to 3V (blue and white), and a 9V battery without any current-limiting resistor can damage the LED. I suggest using a 3V button-type battery like a CR2032 instead, as it would be much safer for testing an LED's polarity.

New LEDs usually have leads that are different lengths. Typically the shorter one is negative and the longer one is positive. The ridge around the base is also flatter on the negative side, but it can be difficult to find the flat side on a small 3mm LED.

—Wilykat

Online Editor Norman Chan

Responds: Good catch, Wilykat! Using a 9V battery to test LEDs is, indeed, potentially dangerous. Testing with a 3V coin battery (like

the CMOS battery on your motherboard) is a safe option, though your best bet is to buy LEDs with the polarity indicated by different lead lengths.

PHOTO OF THE MONTH

It Was This or Two Cats Snuggling Under a Printer

Reader Jessica Forster enjoys lounging in her "gam-ing" basement with a copy of *Maximum PC*.



To enter, send your tech-related, high-res digital photo to comments@maximumpc.com.

We Stand by Our Verdict

I have always held you guys in high regard for judging the quality of a machine out of the box. In your review of CyberPower's PC (July 2008), you say the machine "occasionally failed to boot..." and you scored it a 9? Are you kidding me?

OTHER THAN BLINDING YOURSELF OR A PASSERBY, 9V CAN EASILY FRY THE LED.

The machine is overclocked too far, is unstable, and is failing to POST. This is what I'd expect from our friends at TigerDirect and their CyberPower clunkers. Oh yeah, \$5K is a bargain. I've been with you since the boot days, but you missed the mark on this one.

—Justin Lindee

Senior Editor Gordon Mah Ung Responds:

We chalked up the booting issue to the soft-touch technology used in the Cooler Master case. It's somewhat similar to the soft- or no-touch sensors used in some bathroom-towel dispensers—and sadly, as unreliable. And no, the PC was not unstable; it passed our stress testing and all of our system benchmarking without issues. And yes, when you get \$5,500 in hardware for \$5,000 and you don't have to put it together yourself, it's a bargain.

In the Eyes of the Beholder

I've been looking through my June issue of *Maximum PC*, and I am beyond impressed. At first, I was a bit wary of another redesign of the magazine, but after I read your introduction to the new design and turned the page all I could

say was, "Wow." The fonts that were used to build the magazine are very easy on the eyes, and the various font sizes and transparencies of headlines are a real treat. This issue of *Maximum PC* reminds me more of one of my graphic design magazines, with a lot of dedication given to the typography.

So I commend you and your design staff for featuring two things that are a big part of my life: computers and art. Put those two together and we've got a nice new design that should not be changed again!

—James Husted

Your new format is nice, but the printing is too small. I compared it to last month's issue and the old issue was much easier to read. Remember, some of us no longer have 25-year-old eyes.

—Dan Moule

Editor in Chief Will Smith Responds:

First, I want to thank *everyone* who's written in about our redesign. We've received a ton of email, mostly positive, but there have been a couple recurring complaints, which I want to address here.

■ **Font size:** The complaints are mostly along the lines of, "I don't want to have to put on my glasses to read your magazine." As someone with poor vision, I'm sensitive to legibility issues and I've verified that our font size is no smaller than that of any other magazine published by Future US. I personally measured the fonts of all our publications with a ruler. Next time I go to the ophthalmologist, I'll bring a copy of the mag and solicit a professional's opinion.

■ **White text on colored backgrounds:** We use this style in very few places in the magazine. We use it because it looks nice, although it does impact legibility more than I'd like. Starting this month, we're making some tweaks to those pages to improve legibility; please let me know what you think.

We all appreciate the feedback. If our readers aren't happy, we're out of a job! ☹

■ ■ ■ NEXT MONTH

COMING IN *MAXIMUM PC's* SEND US PRESENTS MADE OF TIN! SEPT ISSUE

Dream Machine 2008

It's our annual sacred task to build the most outrageous, over the top, superfast machine that money can buy. What will 2008 bring? That's our little secret—until next month!

Casual Games

We're on the hunt for the very best time-wasters—free or cheap games that are just as enjoyable in small doses as they are for long stretches of time. It's a tough job, but someone's got to do it.

Maximum PC Turns 10!

Join us as we recall the best technologies, the biggest blunders, and the most memorable moments of the last 10 years. Yes, we've really been doing this for that long!



LETTERS POLICY Please send your questions and comments to comments@maximumpc.com. Include your full name, city of residence, and phone number with your correspondence. Letters may be edited for space and clarity. Due to the amount of mail we receive, we are unable to respond personally to all queries.

Win Rig of the Month

**IF YOUR MODDED PC IS CHOSEN
AS A RIG OF THE MONTH, IT WILL:**

- ▶ **1 Be featured before all the world in *Maximum PC***
- 2 Win you a \$250 gift certificate**

TO ENTER: Your submission packet must contain your name, street address, and daytime phone number; no fewer than three high-res JPEGs [minimum size 1024x768] of your modified PC; and a 300-word description of what your PC represents and how it was modified. Emailed submissions should be sent to rig@maximumpc.com. Snail mail submissions should be sent to Rig of the Month, c/o Maximum PC, 4000 Shoreline Court, Suite 400, South San Francisco, CA 94080.

The judges will be *Maximum PC* editors, and they will base their decision on the following criteria: creativity and craftsmanship.

ONE ENTRY PER HOUSEHOLD. Your contest entry will be valid until (1) six months after its submission or (2) the contest ends, whichever date is earlier. Each month a winner will be chosen from the existing pool of valid entries, and featured in the Rig of the Month department of the magazine. The final winner in this contest will be announced in the March 2008 issue. Each of the judging criteria (creativity and craftsmanship) will be weighed equally at 50 percent. By entering this contest you agree that Future US, Inc. may use your name and your mod's likeness for promotional purposes without further payment. All prizes will be awarded and no minimum number of entries is required. Prizes won by minors will be awarded to their parents or legal guardians. Future US, Inc. is not responsible for damages or expenses that the winners might incur as a result of the Contest or the receipt of a prize, and winners are responsible for income taxes based on the value of the prize received. A list of winners may also be obtained by sending a stamped, self-addressed envelope to Future US, Inc. c/o Maximum PC Rig of the Month, 4000 Shoreline Ct, Suite 400, South San Francisco, CA 94080. This contest is limited to residents of the United States. No purchase necessary; void in Arizona, Maryland, Vermont, Puerto Rico, and where prohibited by law.





SMOKIN' HawgWild U.S.A.

Vic McGuire found a diamond in the rough when he set out to build his latest mod. While browsing through a computer store, he found a custom case with chrome-plated front air grills in the junk pile and an idea came to mind. After arduously sanding the rust off the grills, Vic had the basis for the HawgWild U.S.A.

The side of the case originally held an 8cm fan. After a little work with a scroll saw and a dremel, Vic created a window to show off the rig's parts.

BE A WINNER!

For submitting this month's winning entry, Vic has won a \$250 gift certificate. To enter the Rig of the Month contest, see the official rules on page 92.

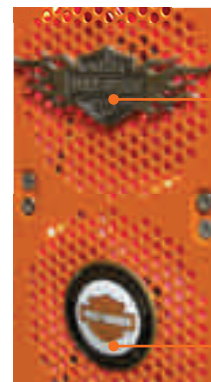


After simulating several paint designs in Photoshop, Vic decided on this black and orange motif with a hammered metal finish as a texture coat.

Vic purchased a model Harley, stripped it, painted it to match the case, and planted it in the window.



The difference is in the details. These official emblems complete the rig's look.



MAXIMUM PC (ISSN 1522-4279) is published monthly by Future US, Inc., 4000 Shoreline Court, Suite 400, South San Francisco, CA 94080, USA. Periodicals postage paid in South San Francisco, CA, and at additional mailing offices. Newsstand distribution is handled by Time Warner Retail. Basic subscription rates: one year (13 issues) US: \$20; Canada: \$26; Foreign: \$42. Basic subscription rates "Deluxe" version (w/CD): one year (13 issues/13 CD-ROMs) U.S.: \$30; Canada: \$40; Foreign \$56. US funds only. Canadian price includes postage and

GST (GST#R128220688). Postmaster: Send changes of address to Maximum PC, P.O. Box 5159, Harlan, IA 51593-0659. Standard Mail enclosed in the following edition: None. Ride-Along enclosed in the following editions: B1, C1, C2, C3, C4. Int'l Pub Mail #0781029. Canada Post Publications Mail Agreement #40043631. Returns: Bleuchip International, P.O. Box 25542 London, ON N6C 6B2. For customer service, write Maximum PC, P.O. Box 5159, Harlan, IA 51593-0659; Maximum PC, 4000 Shoreline Court, Suite 400, South San Francisco, CA 94080. Future Network

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